# INTERNATIONAL FIRE FIGHTER

Reporting Worldwide to Municipal, Industrial and Fire Training Professionals



#### G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

Serialization provides track-ability and immediate access to on-line operational instructions

Integral Inlet Screen prevents debris from entering nozzle and affecting stream quality

> Stainless Steel Slide Valve provides turbulence-free flow control when gated

> > Color-Coded Polymer Pistol Grip, Valve Handle and Covers offer rugged durability in harsh firefighting conditions

m).ttl.com/F5

Your Choice of Fixed, Swiveling, Threaded, Storz or Articulating Inlet Coupling



Flush without nozzle shutdown or pattern adjustment

# The NEW GLOBAL FORCE in Nozzles

Integral Tactile Indicator provides optional preset pattern selection or factory set lock out

NFPA #1964 Compliant

#### Choice of:

- Fixed Metal
- · Fixed Molded Rubber
- Spinning Stainless Steel (shown)



#### Choice of:

- · Fixed Pressure and Flow
- Selectable Flow with Fixed Pressure, or
- 3 Automatic Pressure and Variable Flow Choices

#### Choice of:

- Tip Only
- Shutoff
- Shutoff with Grip Models

Bonded Rubber Bumper provides maximum durability in harsh conditions

Large Index Ring with Indicator allows easy flow, pressure or flush selections with a gloved hand Lightweight Hard Anodized Aluminum Alloy Body includes permanent laser engraved operational markings and highly visible reflective labeling



G-Force



# Large Diameter Hose SUPER HOSE CARRIER

Handled by single operator!

No power source required!







Easy to load, carry, and extend LDH.





Roll up by Ratchet Handle and unload.

Storage into box by Roller Base



- Carrier's lightweight and compactness make it easier to transport, load, unload LDH and load the carrier onto truck easily.
  - Ratchet-type handle lever helps to roll up LDH so easily.

Model dia (mm) Max length LH-100 100-125 50m LH-150 125-150 40m LH-200 150-250 30m LH-300 250-300 20m



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# SPANNING THE GLOBE

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#### Food for Thought

have been an avid reader of National Geographic magazine for many years. I find something of interest in every edition and, occasionally, an article stops me sharply in my tracks.

One recent such article put into sharp, indeed chilling focus the challenges that rescuers are likely to face in the future. Challenges that will not only impact on front-line rescue personnel, they will – as I have often argued in this page in both *International Fire Fighter* and its sister publication *Asia Pacific Fire* – have to be confronted by disaster response specialists, emergency services managements, planners and politicians. The challenge? If you think natural disasters have been getting worse and more frequent, you are right. And if you suspect things may get even worse, you are probably correct.

costly disaster of all time; the World Bank reckons that the Japanese earthquake and tsunami in 2011 cost a staggering US\$235 billion. Most recently in the States, Hurricane Sandy ran up a bill that looks to be in the region of US\$55 billion.

Whether or not you subscribe to the view that global warming is the root cause of the escalation over the past few decades or consider it to be a run of bad luck is not, here at least, the issue. The indisputable fact is that natural disasters are getting more ferocious and more frequent.

Their impact is undoubtedly getting worse due to a number of factors. Not least of which is that the increase in global urbanisation means that natural disasters have the potential to affect greater concentrations of people and buildings; also the desire that many of us have to live in

Whether or not you subscribe to the view that global warming is the root cause of the escalation over the past few decades or consider it to be a run of bad luck is not, here at least, the issue. The indisputable fact is that natural disasters are getting more ferocious and more frequent.

Consider the following statistics compiled by the USA's National Climatic Data Centre – natural disasters including droughts and heat waves, wild-fires, floods, hurricanes, tornados blizzards and freeze-ups. In the 15 year period between 1980 and 1995 there were 46 disasters in the USA causing damages in excess of US\$ one billion. Compare this with the 15 year period from 1995 to 2010 and the number of disasters in the USA in this category nearly doubled to 87. In monetary terms, the total loss in the 1980 to 1995 period was US\$339 billion; the loss in the 1995 to 2010 was US\$541 billion.

Matters have certainly not improved in the past couple of years. In 2011, the USA suffered no fewer than 14 disasters in the US\$ one billion plus category, against the previous 15-year average of fewer than six. 2011 also experienced the most

coastal regions, even if history has shown the areas to be susceptible to flooding or earthquakes. Indeed, the fact that a city has been devastated in even the recent past by a natural disaster seems to bother few people. Just about every city or region in the western world that has been hit by a natural disaster has subsequently experienced an increase in population.

It is a challenge that is going to demand much – probably more than ever before – from each and every one of us in the firefighting and rescue industry, whatever our role or seniority. How we resource and train those involved in disaster planning, communication with those likely to be affected, first-response activities, emergency response management, emergency services cooperation, international cooperation and recovery operations are all going to be of critical importance.



#### A Pump for all Reasons

The HOLMATRO SPU 16 BC Greenline is being heralded as the first pump that emergency workers can use anywhere, for any rescue operation. It is battery-driven and emission-free, and can be used in confined spaces such as tunnels and collapsed buildings without risk to rescue workers or victims. It also has a long running time offering 90 minutes during a common extrication, even with heavy-duty rescue tools. The pump's low noise level and eco whisper mode make it less stressful for victims and improve communication at a rescue scene.

The pump can be used at high altitudes and below zero temperatures – up to –20°C – and a housing protects all parts in wet weather conditions. It incorporates three-stage pump technology that delivers higher flow in the second stage enabling rescuers to cut through the B-pillar of an older model car in half the time it takes a two-stage pump. The third stage delivers lower flow yet higher pressure allowing cutting through hard, reinforced pillars in a controlled manner.



Equipped with single-hose Core technology, the new pump works with all current Holmatro hydraulic rescue

equipment, delivering the same tool performance as other rescue pumps. When a hydraulic rescue tool is used with the SPU 16 BC Greenline, the pump speed automatically increases to maximum to ensure full equipment performance. When the operation is finished, the engine reverts to eco whisper mode, which keeps the pump running at idle speed and a low noise level. Because the pump does not have to be switched off in between operations, it is readily available for use again.

Holmatro has also introduced a quick fix and release bracket, which is currently available for all Holmatro Spider range pumps and the SPU 16 BC pump. The bracket fits in any rescue truck and enables the pump to be pulled out and put back quicker and easier than ever before. It also protects the pump from damage during transport and saves valuable vehicle space.

For more information, go to www.holmatro.com

#### Training Simulator Deal

ARGON ELECTRONICS and Smiths Detection have signed a five year agreement granting Argon exclusive worldwide rights to design, manufacture and market training simulators for the Smiths Detection range of lightweight chemical detectors. This includes the LCD 3.2E, LCD



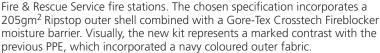
3.3, M4A1 JCAD, M4E1 JCAD and LCD-NEXUS detector series, of which in excess of 80,000 have been sold worldwide to date. The signing of this agreement extends an existing agreement between Smiths and Argon for a further five years.

For more information, go to www.argonelectronics.com

## Brigade Gets Structural PPE

BRISTOL UNIFORMS' Ergotech Action 2 has been chosen by West Yorkshire Fire & Rescue Service, one of the UK's largest fire services for its 1300 firefighters.

Bristol says that, in addition to a full technical and performance assessment, the tendering process also involved firefighter wearer evaluations across all West Yorkshire



The new contract involved the supply of 2200 sets of fire coats and trousers. This will provide for one designated set for each firefighter and a pool of a range of sizes for backup and short term replacement for any kit damaged beyond repair.

For more information, go to www.bristoluniforms.co.uk

#### **Back to Business as Usual**

Just under a year after filing for insolvency, the fire engine manufacturer, ZIEGLER, is reporting full order books again. As the former German market leader, Ziegler says it has now regained almost all of the market shares it had previously lost.

In 2012, the Ziegler Group sold more than 500 fire appliances, most of them to municipalities. The company also won a number of major orders, such as a collective order of 50 fire engines placed by the German state of Hesse, and more than 17 airfield fire appliances ordered by the German armed forces. Ziegler's international business also enjoyed further growth with around 200 appliances sold overseas. The order backlog now stretches far into 2014.

For more information, go to www.ziegler.de

#### Wasp in a Box

The Wasp in a Box from WASP MANUFACTURING is an automated sprinkler protection system which, it is claimed, turns ordinary fire hydrants into smart fire hydrants. It is a small package that can easily be carried by two firefighters. Designed to be attached directly to existing fire hydrants, or control a pumping system should a fire hydrant not be available, the Wasp in a Box is able to control



water disbursement from offsite, removing firefighters from potentially dangerous situations.

Approximately 910 millimetres long by 460 millimetres wide and 460 millimetres deep, it weighs in at less than 45 kilograms. Depending on available water, once attached to a standard fire hydrant it can easily manage over 1500 metres of line with 100 sprinkler heads, protecting an area far larger than most stadiums. Once deployed it can be remotely operated through the standard satellite modem and can then be programmed from any location on the planet, via any computer, satellite or cell phone, to turn on and off when required, conserving water and protecting against flooding.

All Wasp units are also customizable to account for varying conditions and the existing equipment of fire departments.

For more information, go to www.waspwildfire.com

#### **Instant Stabilisation**



The HOLMATRO V-Strut is designed to help rescue workers stabilise any type of car quickly, easily and safely after a road traffic accident. Incorporating an integrated head, non-slip base plate and tensioning belt with a hook and ratchet mechanism, this lightweight, all-in-one tool is ready for immediate use at a rescue scene.

With its unique auto-lock system, the V-Strut takes just 15 seconds to set up. All a rescue worker has to do is pull it out to the required length and it locks automatically in a single movement. Fine length adjustment allows accurate positioning of the V-Strut whether the vehicle is on its side or roof. A tensioning belt with a hook and ratchet mechanism secures the V-Strut to the car, rapidly creating a stable

triangle. In addition, the serrated, multi-purpose head maintains a firm grip and the non-slip base plate prevents the strut from sliding away on any surface.

The V-Strut has a high shoring capacity of 16 kN. Nevertheless it weighs only 7.2 kilogrammes, so is easy to carry and handle. A sliding heat-resistant cover protects the tensioning belt against hot exhausts.

For more information, go to www.holmatro.com



#### From Sea to Shining Sea



PIERCE MANUFACTURING has signed deals across the USA, including four Pierce Aerial Tiller vehicles from the San Jose Fire Department in San Jose, California. These are the fire department's first Pierce aerial tiller vehicles, and all four were placed into service early this year.

The Aerial Tiller vehicles are built on the Pierce Arrow XT chassis with a raised roof cab, seating for five firefighters, and integrated frontal impact and side roll protection systems. Each vehicle features a 30-metre aerial ladder, TAK-4 independent suspension on both the front axle and the fifth wheel trailer, and an overall length of just 17.5 metres to meet fire station's

apparatus bay requirements.

Pierce has also announced that recently the Wichita Fire Department in Kansas ordered 10 Dash CF custom fire appliances – nine pumpers and one aerial platform – and three Dash CF pumpers were purchased by the Midlothian Fire Department in Texas.

The Dash CF features a tilting cabforward design that repositions the engine rearward and down low between the frame rails, with an open interior configuration to help firefighters better prepare for the unexpected situations they face when arriving on scene. The vehicle,

says Pierce, dramatically increases driver and officer interior cab space, improves visibility and serviceability, and sets a new benchmark for heavy-duty construction – all in a compact easy to manoeuvre wheelbase.



Pierce has also supplied three fire appliances to the Wintersville Volunteer Fire Department in Wintersville, Ohio. The vehicles are a 29-metre Quint heavy-duty aerial ladder, a Pierce Ultimate Configuration (PUC) pumper, and a Responder quick attack pumper.

For more information, go to www.piercemfg.com



#### **New Airport Vehicles**



Four additional ZIEGLER Z8 crash rescue tenders have been put into service at the Munich Airport fire department in Germany, bring the number of Z8 units at the airport to seven. The order followed the delivery of six 6 Z8 model XXL to Frankfurt Airport Authority.

For more information, go to www.ziegler.de

#### **New Tower Harness**

MSA has unveiled the Evotech Tower full-body harness that incorporates a body belt and saddle to provide unsurpassed comfort during long shifts. It offers variable-width webbing in the sub-pelvic area to increase comfort and support, adjustable D-ring position, integral body belt and removable saddle constructed of dual durometer pad and Sorbtek fabric for ultimate comfort. The harness has ANSI/OSHA and CSA approval.

For more information, go to www.MSAsafety.com







#### From the creators of handheld thermal imaging

Introducing the world's smallest, lightweight, high resolution thermal imaging camera, the Argus Mi-TIC. As you would expect, this latest innovation from Argus provides crystal clear image quality at extremely high temperatures, whilst at the same time allowing you to clearly see very low temperature objects like casualties. The Mi-TIC is a small format thermal imager that can be easily and comfortably held in the palm of your hand. Its unique design allows rapid fixing to a pocket, BA straps or it can even be stored in a pocket for quick access. With a less than five second start up time and simple thumb operated functions the Mi-TIC delivers a unique balance between industry leading performance and ease of use.

#### PBI - 30 Years' Suc Innovation



This year marks 30 years since PBI first opened its doors in Charlotte, North Carolina to create a legacy of the highest performing protective fabric solutions that has become recognised all over the world.

BI fabrics are renowned for their unique combination of flame resistance, durability and comfort, which is why they are first choice in protection for the most extreme conditions, from NASA's astronauts to emergency responders, the military and formula-one drivers. Today, PBI is a global force in personal protection and is a recognised marked leader in USA, Europe, Asia, the Middle East and Australia.

The success of PBI's products is attributable to its team of specialists, who work closely with customers to develop a detailed understanding of their needs, and are committed to continuous improvement and product innovation.

The PBI outer fabric is made up of 60 percent para-aramid fibre, which means that it is much lighter than other fabrics made from meta/para-aramid blends, and achieves a higher standard of flame resistance. PBI fabrics will not become brittle, shrink or break open when exposed to flame and high temperatures, which is one of the difficulties that other fabrics face. This also means that the integrity of the internal layers of the garment is protected and the transfer of any radiant heat is slower.

Wilfried Gräfling, fire chief of the Berlin fire brigade comments: "Our motto for the procurement of protective clothing was 'only the best for our firefighters'. It was important to find an outer shell with the best protection, excellent comfort, high strength and a good appearance that would last for many years. We tested for a long time with different combinations of fabrics available in the market and came to the conclusion that PBI was the right choice. The Berlin Fire Department is very enthusiastic about these suits!"

The outer fabric is the first line of defence in any protective clothing ensemble and has to be strong and durable to cope with the impacts and abrasions that come with the job. It does not matter how well a fabric protects the wearer if it will not hold up to the working environment. PBI fabrics are incredibly durable with extremely high tear and UV resistance. Many customers who have chosen PBI fabrics have noted that structural PPE remains in better condition and requires less maintenance than previous ensembles, potentially extending the lifetime of PPE without compromising on protection. Of course, high durability also means low maintenance.

#### cess through

PBI Gold was the first fabric developed by the company that was specifically designed to protect firefighters and was instantly recognisable due to its distinctive golden colour. In the late eighties, impressed by its high performance, comfort and durability US fire services started to switch to PBI fabric. New York City Fire Department chose PBI in 1994, which was a catalyst for significant growth and success in the US. The company began to market PBI Gold internationally in 1996 and has enjoyed similar success in all overseas markets.

Since its introduction in recent years, PBI Matrix is extending the success achieved by PBI Gold. A durable matrix of high strength para-aramid filaments is woven into PBI Gold fabric to enhance its resistance to wear and tear, while at the same time retaining superior flame and heat protection. The result is a fabric that is light-weight and flexible, but incredibly strong and resists dangerous chemicals and acids. PBI Matrix provides maximum protection and comfort at a minimum weight.

PBI Triguard, a lightweight fabric that offers high levels of flame, heat and arc flash resistance, is now the standard in providing value and performance in the petrochemical, gas and electricity industries. The fabric remains supple after exposure to heat and flame and retains more than 85 percent of its tensile strength after ten hours contact with hydrochloric acid, sodium hydroxide, acetone or petrol.

PBI Baseguard has been specifically engineered to be worn as a base layer. It is incredibly light and soft, creating garments that are cooler, drier and absorb perspiration better than any other knit fabrics on the market. The fabric wicks eight times more sweat from the body than cotton and 1.5 times more than other aramid fabrics. Garments made with the fabric will not shrink or alter their shape with wear, unlike other more conventional next to skin clothing.

lan Callaghan, Director, International Sales and Marketing, PBI Performance Products said: "In the past 30 years, PBI has become a global leader for





protection in extreme environments because its customers recognise the truly high performance standards that PBI products achieve. We have always let the products speak for themselves and we give customers the chance to visit independent tests of our fabrics so that they can see an impartial comparison of the combination of protection, durability and comfort that make PBI fabrics unique."

He continued: "We are excited about the next 30 years and continue to invest heavily in research and development to ensure that PBI will remain at the forefront of the market, creating new products that meet the needs of our customers."

One of PBI's many UK customers, Bedfordshire Fire and Rescue Service, has protected its fire-fighters with PBI for more than a decade. Chief Fire Officer, Paul Fuller, said: "Our philosophy has always been to procure structural firefighting kit that offers the best possible protection for our firefighters. PBI fabric has been an essential part of our PPE for many years because we believe it delivers the best combination of performance, protection and durability to meet our operational needs."

For more information, go to www.pbiproducts.com

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#### **NEWS**

# **BP Gets Protection**

OSHKOSH CORPORATION has delivered ten vehicles to British Petroleum (BP), including four Pierce industrial pumpers, one Pierce Sky-Boom aerial water tower, and four Oshkosh Stinger Q4 rapid intervention



vehicles. The contract also included a field service vehicle manufactured by Iowa Mold Tooling Co, an Oshkosh Corporation Company. Two of the units were bound for oil terminal facilities in the Republic of Azerbaijan, while the remaining eight were destined for BP facilities in Iraq.

The four Pierce industrial pumpers are each built on the Arrow XT chassis with a raised roof cab, seating for six firefighters, a tandem rear axle, and a 515 hp engine. The firefighting system includes a Husky 300 foam system, a 4543-litre foam cell, and a 900-kilogramme dry chemical system, and twin industrial monitors with 7570 litres-a-minute nozzles. The Pierce Sky-Boom aerial water tower is also built on the Arrow XT chassis. The vehicle features a 20-metre aerial device, a 2840-litre water tank, an 1892-litre foam cell, a 226-kilogramme dry chemical system, a Husky 300 foam system, and twin industrial monitors with 7570 litres-a-minute nozzles.

The four Oshkosh Stinger Q4 Rapid Intervention Vehicles are compliant with NFPA 414 performance specifications and feature a four-door cab, aluminium body construction and 4x4 all-wheel drive. The Stinger Q4 is equipped with a dual agent hand line nozzle, and a front bumper turret. The IMT Dominator CS Mechanics Truck features body materials constructed from rugged galvanneal steel, with a patented body substructure design, an electrical system using automotive-style harnesses, and body storage capacity of 3.4 cubic meters.

For more information, go to www.oshkoshcorporation.com

# Tunnel Operator Training

The department for Roads & Tunnels in The Hague in the Netherlands recently organised three large scale tunnel incident exercises using the RescueSim virtual incident management simulator developed by VSTEP as part of its compulsory yearly training. The goal was to train tunnel operators for specific tunnel emergency response procedures and improve communication with the emergency services.

The tunnel incident exercises took place in the control room of the Hubertus Tunnel in The Hague. Each exercise consisted of two sessions in which six tunnel operators were trained in emergency procedures, incident response and communication during various tunnel disasters including tunnel fires, smoke hazards and traffic accidents.

Using RescueSim, virtual accidents and incident scenarios were simulated on the control room screens, enabling the tunnel operators to experience all necessary incident procedures and communications exactly as they would in real life. To ensure maximum realism, the Hubertus Tunnel was closed for traffic, which allowed the operators to activate the actual tunnel alarm procedures during the virtual incident training.

For more information, go to www.rescuesim.com

## Training Centre's New Platform



Safety training and offshore services company, FALCK NUTEC, has invested £400,000 in a state-of-the-art helicopter landing platform at The Fire Training Group's (TFTG) training centre at Aberdeen Airport in Scotland. The Helideck platform replicates those used to transport oil and gas industry personnel to offshore installations and vessels.

The training rig is 16 metres in diameter, which is double the size of the existing facility at the site and allows a far superior training experience for delegates. The Helideck features a simulator of the new E225 helicopter design.

For more information, go to www.falck.com/nutec\_uk

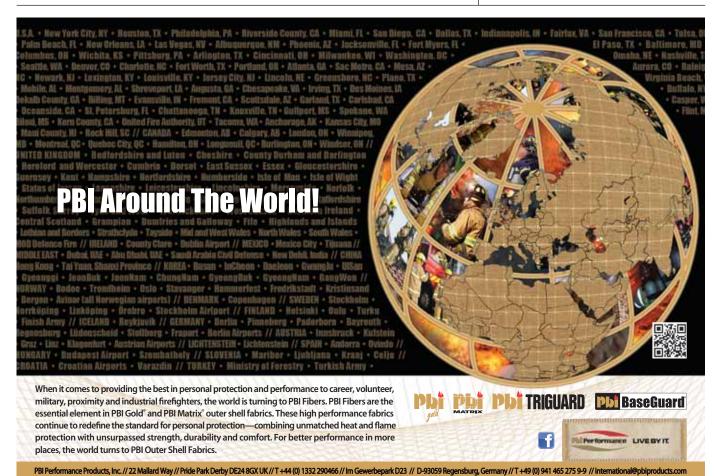
# **Breaking Glass**

The most recent innovation from LIFE SAFETY PRODUCTS BV is the Lifehammer Evolution, a new safety hammer.

Simply press the hammer against a car's side or rear window, and the ultra-hard glass-reinforced plastic ceramic hammer-head will come out, shatter the car window and reload automatically. This action can be repeated numerous times. It also integrates a seatbelt cutter, and a non-slip grip and conical-shaped handle ensures a firm and reliable hand grip. It can even be used under water.

The new hammer is particularly useful when, for example, a car is submerged in water, the car battery is damaged, or faults in the electrical systems make it impossible to open windows or doors. The Lifehammer Evolution recently the won the Reddot Design Award in the automobiles, transportation, commercial and water vehicles category.

For more information, go to www.lifehammerproducts.com



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# Thermal Imaging is all about the Image

ISG INFRASYS is one of the world's few providers of thermal imaging cameras that actually designs and manufactures its products in-house. Because of this, the company is able to offer thermal imagers created specifically for use in firefighting that are able to perform better in the environment for which they were designed.

he fundamental use of a thermal imaging camera is as a navigational tool, to help the firefighter see through dark and smoky conditions in order to see more of the surrounding environment. To make our thermal imagers the best they can be we start with the image itself, enhancing it in the infrared engine to make it as clear as possible, and then engineering it to automatically adjust dependant on the scene being imaged.

The result of these key components, not only ensures the maximum information is given to the firefighter at all times, but when coupled with using only the best and highest resolution detector and display technologies, add up to an excellent quality, crisp and clear thermal image, unrivalled by any other hand-held firefighting thermal imager available.

The E380 is the latest innovation from ISG Infrasys and is our first product to accommodate our new SIGMA engine technology. With super-high resolution and over 100,000 pixels, the SIGMA engine updates more than 5.5 million scene elements every second, far surpassing the capability of any infrared engine the industry has seen before. The camera's dynamic temperature range exceeds 1000°C, ensuring that even in the most dangerous situations, the E380 will continue to provide a clear image, no matter what.

While many other models of thermal imager offer various extra functions, at ISG Infrasys we believe in keeping things simple and uncomplicated by not adding unnecessary features, and including only features that will genuinely enhance the use of the product, and will help to keep the firefighter and his team safe.





feature is directly linked to the camera's colourisation so that the user can immediately identify any temperature differentiations. As a guide, the user can identify an approximate temperature of an object just by using the colours, but with the DTM feature installed, an accurate reading can also be taken; particularly useful when monitoring the temperature of objects in the scene.

In addition to DTM, the E380 is the world's first thermal imager to incorporate our new and exclusive HOT SPOT TRACKER feature, installed as standard on every E380. Ingrained into the SIGMA engine to ensure maximum responsiveness, this new innovation allows you to measure temperatures in an entirely new and dynamic way.

A single button press activates the HOT SPOT TRACKER and immediately tracks the hottest object in the scene using a blue cross, while simultaneously displaying the object's relevant temperature for reference. Firefighters are now able to immediately identify hidden hot-spots or locate the seat of the fire, all in real-time, making for faster and more efficient decision making, crucial in emergency situations.

For those users that require more functionality, the E380 is also compatible with the TAC-grip accessory, housing a laser pointer and video recorder capable of capturing around four hours of video and thousands of still images, all easily downloadable via USB.



For more information, go to www.isgfire.co.uk

#### **NEWS**

#### From Radiation Meters to Training Detectors

ARGON ELECTRONICS has launched two new simulation probe kits that allow real radiation meters to be used as simulation detectors in CBRN response training exercises.

The kits comprise a range of simulation probes that can be used to convert the Canberra RDS100 and AN/PDR77 detectors into a complete training system, including simulation Alpha, Beta and Gamma sources, an instructor remote controller, carry case and user manual.



They are easy to use; all the instructor has to do is connect the simulation probes to the meters in place of the real detection probes and deploy the simulation sources as required for the exercise.

Probes are available for Alpha, Beta and Beta Gamma simulation sources. Alpha and Beta probes respond to safe, easy to hide simulation sources, while also responding to PlumeSIM to simulate response to airborne Gamma threat. Beta Gamma probes respond to standard Argon Beta Gamma simulation sources and also PlumeSIM. The simulate Beta Gamma probe is a DT616 probe lookalike that also functions with the Canberra AN/VDR-2 meter. The remote controller provided for the instructor enables simulation of full and partial decontamination for all three probe types and each simulation probe is powered directly by the detector.

For more information, go to www.argonelectronics.com

#### Horizontal Tool Holder

ZIAMATIC CORPORATION (Zico) has introduced the QM-ET-H3 Holder, designed for the horizontal mounting of cutters, spreaders, and combis with grip handles that wrap completely around the tool body.

Holder comprises four heavy-duty aluminium components: one cradle, one strap bracket, and two tip

brackets. These can be configured in a variety of ways to best accommodate a specific tool. It mounts to nearly any flat surface and is described by Zico as being "perfect" for storing extrication tools in bumper "coffin" compartments and other spaces where height is restricted. Gravity keeps the heavy tool resting firmly in the cradle, secured snugly in place by a heavy-duty

nylon retention strap. The high-strength tip brackets keep the blades/arms from shifting during transport. When needed, the tool is simply unbuckled and lifted up off the shelf.

For more information, go to www.ziamatic.com



#### Ziegler Unveils World's Smallest Three-Axle Pumper Tanker

German fire truck manufacturer, ZIEGLER, has introduced its latest innovation – the smallest triple-axle pumper tanker fire truck in the world.

he Ziegler Fire Ant is an extremely compact, robust and reliable special-purpose fire truck measuring just 1.7 metres wide, 2.5 metres high and less than six metres long, and carries a payload of 4.9 tons. It carries on board an enclosed 2500-litre stainless steel water tank and all of the equipment required under German fire-fighting standard DIN 14530-18;2011 – 4.

The lightweight and high stability Fire Ant is built on a Multicar FUMO 6x4 chassis and has outstanding manoeuvrability characteristics. It is ideal for narrow roads and areas that are hard to access with normal fire trucks, in particular in medieval town centres, pedestrian zones, mountainous regions, and for mining and other industries. The first model off the production line has a total weight of 7.5 tons and is ready to go into operation.

All of the Fire Ant's equipment and component, including the pump, is manufactured by Ziegler according to the company's world-class quality control standards. The fire Ant incorporates a tiltable Multicar space frame driver's cab with single seats for the two crew members. The superstructure has aluminium planking and provides five lockable AZ fast-access rolling shutters. A ladder mount on the roof enables safe removal from ground level. Instead of a PTO (power take off) driven water pump, a telescoping portable centrifugal fire pump is stored in the superstructure. It has a maximum output 850 litres-a-minute at 10 bar and a three-meter suction height.





Other features of the Ziegler Fire Ant include an extra wide rear opening and a telescopic drawer for the portable pump. Two optional 20-litre foam tanks enable the Ziegler Fire Ant to provide either water or foam intervention.

The company is headquartered in the Swabian town of Giengen in southern Germany, with two German subsidiaries and five companies abroad. These include additional manufacturing facilities are in Rendsburg and Mühlau in Germany, Winschoten in the Netherlands; Bolzano in Italy; Seville in Spain; Zagreb in Croatia; and Jakarta in Indonesia. Prior to the unveiling of the Ziegler Fire Ant, the company launched the "Merkur" an electric-drive tunnel rescue vehicle that has already won international applause, as well as a nomination for the prestigious ADAC (Europe's largest automobile club) Yellow Angel award for innovation.

In 2012, the Ziegler Group sold more than 500 fire engines, most of them to municipalities, airports and industries. The company also won a number of major orders, such as a collective order for 50 fire engines placed by the state of Hessen and more than 17 airfield fire engines ordered by the German Armed Forces. Ziegler's market share has already again reached more than 20 percent in Germany. The company's international business also enjoyed further growth; Ziegler sold around 200 fire engines abroad. The order backlog now stretches far into 2014.

A video, photographs, brochure and a technical specification sheet are all available on Ziegler's website at www.ziegler.de.

For more information, go to www.ziegler.de





#### Portuguese Lift | Pressure-reducing



CTE has recently delivered a B-Fire B-370 firefighting aerial platform for firefighters in Alcabideche in the municipality of Cascais, south-west of Lisbon, Portugal, the second B-Fire platform in operation

in the country. This platform reaches 37 metres high, is equipped with an emergency ladder and a water/foam line, a main non-telescopic jib and a second jib.

The company has also supplied a B-Fire 330 to the Gasco oil and gas company based in Abu Dhabi – a joint venture between Abu Dhabi National Oil Company (ADNOC), Shell, Total, Partex, and Atheer. The B-Fire 330 reaches a working height of 33 metres.



For more information, go to www.ctelift.com

# Redefining 'Responsible' Foams Angus Fire takes its responsibilities seriously. The fire fighting performance of our foams remains our number one priority. Saving lives and protecting property coupled with trusted chemistry that respects the environment remains our ultimate goal. Our new C6 Foam Formulations are developed with all these factors in mind. Specify Angus Foams – the responsible decision. Thame Park Road, Thame, Oxfordshire OX9 3RT UK Tei: +44 (0)1844 265100 - Fax: +44 (0)1844 265156 Email: general.enquiries@angusuk.couk Web: www.angusfire.co.uk

# Pressure-reducing Valve

A pressure reducing valve for seawater fire hydrants has been introduced by BOISWOOD. The Mankenberg DM668E is a diaphragm-controlled, spring-loaded valve for medium flow rates and combines shut-off and pressure reducing functions.

Intended for use on offshore installations such as oil and gas platforms, this new medium-controlled valve is credited with offering accurate control while being easy to install and maintain. The pressure downstream of the valve is controlled without the use of pneumatic or electrical control elements.

Its spring module, comprising spring cap, spring, adjusting screw, diaphragm and internal components, is connected to the valve body by a quick-release clamp ring and two bolts. This makes changing the diaphragm or the complete spring assembly for a different control pressure simple without the need for special tools. Servicing and maintenance are also simplified.

The inlet pressure is 9-20 bar, while the outlet pressure range is 6-8.5 bar. A wide variety of hose couplings can be supplied.

For more information, go to www.boiswood.co.uk

#### Wildfire Protection



TETRAKO has announced the introduction of the TetraKO Wildfire Protection System, heralded as a comprehensive and integrated system that comprises the TetraKO TurboMixer, the TetraKO TurboSkid, and TetraKO's water enhancer powder concentrate.

The TurboMixer is built for large batch mixing of TetraKO powder concentrate with water for rapid off-loading to any fire apparatus. It utilises an optional Waterous pump to thoroughly circulate and mix the TetraKO solution within five to seven minutes. The TurboSkid Unit is designed for placement on the flatbed of a pickup truck or on a trailer. It comes equipped with a 750-litre tank and an 18 hp Waterous pump. The TetraKO solution can be mixed while the vehicle is in route to a wildfire.

For more information, go to www.tetraKO.com

#### **Russian Oilfield Comms**

Advanced TETRA technology from ZETRON is enabling the coordination of safety and operational communications in the remote Exxon Neftegas Chayvo oil field on Sakhalin Island, which lies to the north of the Japanese island of Hokkaido, just off the east coast of Russia.

The oil field's production platform, onshore processing facility and oil terminal are each equipped with Zetron DCS-5020 Digital Consoles linked by E1 circuits. Zetron's advanced digital consoles give operators control over all marine-band UHF, air-band VHF and MTM700 TETRA radios, as well as land-line telephony. Additionally, Zetron Model 390 remote desktop controllers are deployed on the oil field's production platform to give workers and safety staff fully-functional access to the TETRA network without the risk of localised RF energy causing an explosion.

For more information, go to www.zetron.com

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LET'S WORK.

#### **VEHICLE SUPERSTRUCTURES**

Large volume fire structure on MAN chassis containing 20,000 litres of water



# GRP Superstructures Come of Age

The time has now long since passed when prejudices and misconceptions about the use of GRP for firefighting vehicle superstructures limited its share of the international market. Today, the unique features of the material and the research and development work that has gone into developing new and improved solutions has undoubtedly made GRP (glass-fibre reinforced polyester) the material of choice for fire and rescue services around the world.

**Bardo Govaarts** 

Plastisol BV

whole raft of firefighting and rescue vehicles are today delivered with custom-built composite superstructures, cabins and crew-cab extensions, including ARFF (Airport Rescue and Fire Fighting), rapid intervention, municipal fire and rescue service and industrial brigade vehicles, pumpers, ladder trucks and water tenders, as well as any number of anti-riot and Hazmat vehicles, along with ambulances, police and defence vehicles.

Netherlands-based Plastisol, the world market leader in the production of glass-fibre reinforced polyester bodies for firefighting vehicles, has more than 40 years of experience in this specialist field. Its composite materials, some of which incorporate foam cores, are injected with resin and are produced using a vacuum injection process developed by the company. After curing, this results in an exceedingly strong "sandwich" of materials that can subsequently be painted in any colour. When completed, these monocoque body parts are fully self-supporting constructions – no steal framework is used in the construction – that are fixed rigidly on the vehicle's chassis with metacone high load capacity mountings.

#### Layer Design

In order to achieve the maximum strength and minimum weight, at Plastisol each panel has its own layer plan, with the layers being constructed out of a variety of fibre materials, fibre lengths, filament thicknesses and a wide variety of fabrics, woven types and fibre orientations. Together, these determine the strength of the finished component.

A large variety of core materials, densities and thicknesses are also used to increase the component's strength, reduce its weight, and achieve the desired sound and heat insulation characteristics.

The final injected laminates, out of which the superstructure will be built, have a minimum glass content of 40 percent, as well as a maximum rest-styrene content of three percent. The average wall thickness is 38 mm.

The core material comprises a closed-cell core structure with a minimum density of 60 kilogrammes per cubic metre. The laminates comply with DIN 53438, DIN 52306 and DIN 52307 for splintering of the material and flame retardant characteristics. The superstructure is completely UV-proof and can be put into service at temperatures ranging widely from –40°C to +80°C. The applied injection resins have a minimal HDT of 85°C.

#### **Superior Performance**

There are several compelling arguments for adopting GRP for firefighting vehicle superstructures.

One of the most persuasive considerations is that a GRP superstructure is up to 40 percent lighter when compared with alternative construction methods. This enables the vehicle to carry a significantly greater weight of firefighting equipment than would otherwise be possible, adding significantly to the vehicle's efficiency, versatility and cost effectiveness. This cost consideration is boosted by the longevity of the material and its maintenance and repair characteristics. As well as requiring no routine maintenance, GRP is completely corrosion proof, so there is no chance of

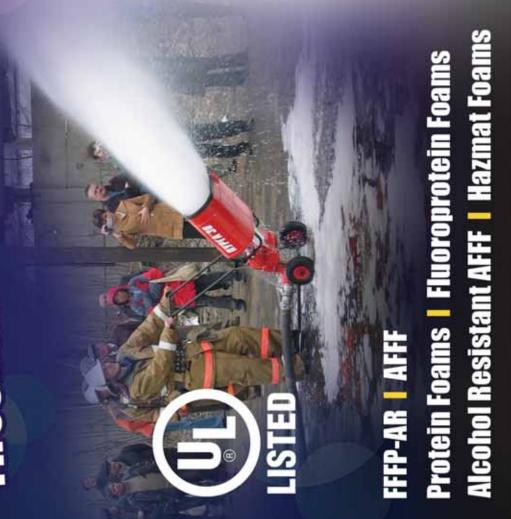


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corrosion being caused by frequent contact with liquids carried on the vehicle or present at the scene of an emergency.

It is also dynamic force shock absorbing at the point of impact, which provides greater safety for the crew and can prevent expensive structural damage to the vehicle. GRP is also easy to repair. Significantly for firefighting and rescue operations, GRP is also flame retardant and selfextinguishing.

The life expectancy of GRP is approximately 40 years, and its versatility provides the vehicle designer with greater flexibility and creative freedom to ensure that the vehicle is a perfect match to the customer's specification. Almost any shape can be produced. Each part of the vehicle is exposed to different potential impacts and stresses, such as force accelerations, torsion, impact, heat, pressure, and shear, so extensive calculations are carried out to verify the properties and to ensure that sure all safety factors are maintained. Detachable panels are incorporated to provide each module with access to chassis components for maintenance or inspection purposes.

#### **Typical Applications**

While the vast majority of superstructures are customised to the customer's specific needs, the market is now sufficiently well developed that there are several core designs, each of which can be modified.

Superstructure designs are available that provide various roll-down shutters and an inside tank, with the tank volume, number of roll-down shutters, steps and other facilities included in line with the customer's requirements. Designs can also incorporate integrated cable ducts and mounting profiles to achieve the maximum usable space, steps with corners finished with rubber profiles, various lighting options and even an integral crew cab.



Fire truck containing 8,000 litres water and 500 litres of foam

22





While many superstructures are provided with tanks of a few thousand litres capacity, some vehicle applications call for considerable larger volumes of water and/or foam to be transported. Such large-volume superstructures have been constructed where, for instance, 20,000 litre tanks have been incorporated in the design. Ladder trucks, hydraulic platforms and tow trucks require extra-low superstructures and these platforms can also be provided with roll-down shutters and lighting. Rapid Intervention Vehicles (RIV) usually have a smaller chassis, as these vehicles have to arrive quickly at the scene of an emergency. Again, a compact composite superstructure can be provided with the usual options like roll-down shutters and lighting.



A 6x6 crash tender delivered to a Far East airport, containing 12,000 litres of water and 1,440 litres of foam

Rescue vehicles can be provided with a "normal" superstructure or loose containers usually intended only for the transportation of equipment. The advantage of this modular container concept is that assistance can be provided in several places at the same time by dropping off individual modules where they are most needed. The interior of the superstructure is often fitted with C-profiles to enable the end user to incorporate flexible, easy access shelving.

Hazmat trucks are deployed when the presence of hazardous materials could lead to a heightened risk developing. In addition to a water/foam tank and the usual storage options the hazmat superstructure also contains a separate control room. Possible options include a decontamination unit, a hydraulic loading platform, a high-pressure unit, a hydraulic power supply generator, warning sirens and various lighting configurations.

Bardo Govaarts is Design manager at Plastisol BV

For more information, go to www.plastisol.com





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Visit www.dsfire.gov.uk/trainingacademy or email trainingacademy@dsfire.gov.uk

Picture courtesy of Task Force Tips



#### Fire hose nozzles: How to choose and use the right fit

Anyone can try to make all situations fit only a single nozzle's parameters, but this is a false supposition that could create safety issues for your crews as they advance into a structure

By Michael Lee

his article will deal with the art of extinguishment as it applies to the team process that an attack line crew should utilize when applying water on a fire.

The art of extinguishment has many different opinions when it comes to nozzle selection and application of water streams.

Having 25 years of experience, I know that I will not convert the zealous opinions held by noboperators worldwide. When selecting the nozzle to utilize, they are generally the ones at hand that are already on your department's pre-connects.

Whether or not you agree with that choice, the bottom line is to know what a solid stream or fog nozzle is capable of and when they should be utilized.

Anyone can make a decision to use only a single nozzle and try to make all situations fit that nozzle's parameters. This is a false supposition and could create safety issues for your crews as they advance into a structure.

It is a better approach to know what each nozzle brings to the party so that you can choose the right tool for the job. Doing things "the way we have always done it" is no basis for a professional decision.

#### **Effective stream operation**

We will begin by covering the rules of effective stream operation. The first item for consideration is choosing the most effective nozzle based on the possibility that people may be near the seat of the fire

How much steam production will your nozzle produce when water hits fire? Using a solid stream or fog nozzle (on solid stream position) should aid in the rescue of victims and reduce steam production.

After the attack line has been selected, deployed and charged, open the nozzle to bleed the air and check the nozzle pattern. It might be a good idea to flow the nozzle long enough for the engineer to set his pump pressure at this time.

#### FIRE HOSE NOZZLES

Picture courtesy of Task Force Tips



Once interior, it might be more difficult to find your nozzle pressure is woefully inadequate because you did not ensure both you and your engineer are on the same page.

In addition:

- All personnel on the attack line should be on the same side of the hose.
- Check exterior doors for heat prior to opening.
   If the door opens inward, stay to the side of it to prevent fire blowing out of the door and exposing the firefighter to dangerous levels of heat or smoke.
- Some departments require their initial attack crews to utilize a short piece of rope or webbing to close the door if it appears they will need to do it quickly.
- For doors that open outward, stay behind the door and use it for cover until you are comfortable that the environment will allow for keeping it open.

Once the door is open, make a quick sweep of the threshold to look for victims. Prior to entering

# While we have to work in the smoke and heat, it makes more sense to stay out of the ignitable gases that stratify above our heads.

the structure, sound the floor strongly to ensure the existing structure can support the weight of the team.

Stay low when smoke is to the floor; otherwise use your best judgment to gauge the required speed the team must advance the hose line versus the ability of the team to visualize the area ahead for safety.

Feel walls and floors and check the ceiling periodically for fire above, below or beside your crews as they move through the structure.

Utilize thermal imaging cameras to direct interior crews and continue sizing up the structure for fire spread or victim locations.

Also, continually monitor the hose line to ensure a sufficient amount of hose to reach the fire. This may require some personnel to drop back to assist with moving the hose line through doors and around corners.

Exterior back-up teams may be considered to assist with moving the attack line through the front door.

If possible, try to vent heat and gases from the

area of the fire before accessing the fire room. The positive pressure attack tactic works well for this objective, but like all tools in the toolbox, it is not always the proper tool for the job.

Staying low to the ground accomplishes a few things: It increases visibility, reduces the environmental heat abuse the attack team takes and helps to keep the attack crew from operating in the fuel-rich gases generated by the breakdown of the contents of the fire.

While we have to work in the smoke and heat, it makes more sense to stay out of the ignitable gases that stratify above our heads.

In addition, utilize doors, dressers or beds as cover when opening the pre-connect to reduce the blowback of steam as it expands upon hitting the fire. I have seen firefighters who feel this is not tough enough or brave enough, but it does reduce the overall punishment your body will absorb over a 20-year career.

If fire is exiting the top of the doorway when opened, hit with your steam to cool and control the fire gases. Sweep the floor if necessary to cool burning debris and hot surfaces.

Test the integrity of the floor inside every door prior to committing the team's move forward and take the time to ensure there is not fire burning overhead before entering and placing a fire behind your crew.

Many departments teach that opening the water line should only be done when fire can be seen. The thought is that water on smoke doesn't put out the fire but only causes water damage.

However, using water overhead can cool down fire gases that may be pre-flashover and cool the environment. A combination attack is a good selection when the fire area has high heat levels.

This method consists of applying water to the fire and area above it, utilizing a narrow fog or straight stream in a T, Z or O pattern.

This can also be called "penciling the ceiling," bringing its temperature down to prevent a flashover until the fire can be extinguished. It is critical to use a narrow stream at this time to prevent significant steam generation.

This pre-flashover prevention is one of the times when the survival of the interior attack crews overrides the creation of a tenable environment for a victim.

If the room the crew is accessing is hot enough to be considered pre-flashover, the likelihood of a survivable victim is extremely low. Once the seat of the fire is found, open the nozzle and hit the main body of fire.

When the fire is knocked down, shut your nozzle down and let the area vent. Open the nozzle again if necessary to finalize the extinguishment of the fire.

#### **Basement fire considerations**

When advancing hose lines into a structure, it is not guaranteed that you will rapidly find the seat of the fire. This may be as a result of a fire below the attack crews instead of on the floor they used to advance into the structure.

If you find that the area into which your crew is advancing is very hot and you have found no fire, consider a basement fire.

Note: Attack line selection for a basement fire should consider the nozzle that will cause the least amount of steam generation (i.e., solid bore).

#### FIRE HOSE NOZZLES

While a large number of fire departments are moving toward the consistent use of a solid bore nozzle, the use of a fog nozzle can be an effective tool if you keep a few safety thoughts in mind:

- Use of a fog nozzle should be restricted to unoccupied/confined spaces.
- Area opposite the direction of the nozzle should be adequately ventilated to allow for steam movement.
- No more than a 30-degree angle should be used in an initial fire attack.
- Only use a fog nozzle when reach of stream is not a problem.

Transitional attacks are those types of fires when an exterior attack is used to assist with getting an initial volume of fire knocked down and then having interior attack lines finish the extinguishment.

This may be required if on-scene resources are insufficient to advance the number of large hose lines required to attack from the interior, or it may be the initial method of controlling the fire during the time it will take to stretch the lines into the interior

It is critical that all crews on the fireground are aware that an exterior line is being used to make an initial knock. Communicate to attack crews when to initiate their interior attack once the exterior suppression is complete.

In addition, crews who utilize this attack should be more aware of the supporting structure if they are sending crews interior during a transitional attack. It is critical that they test the structural integrity of the floor and watch the ceilings constantly to keep from being caught in a collapse

Another concept that cannot be reinforced strongly enough is the need for and consistent application of a back-up line.

This line is necessary when initial attack lines are not quickly controlling the fire. It should be the same size or larger than the initial attack line.

I recommend a 2½" back-up line for all fires. Yes, it is bulky and difficult to move, but if the initial 1¾" pre-connect is ineffective, larger volumes of water are the next best answer.

Some departments recommend the advancing of the back-up line into the structure immediately following the placement of initial lines, but I will leave that to the IC to decide.

When using a back-up line, position it close to initial attack lines, and it must be charged and ready to be effective. Once fire is out, back-up lines may be shut down and smaller lines used for overhauls.

Extinguishment is the tactic for which all firefighters joined the fire service. As this is the "meat and potatoes" of our profession, we should be smooth, practiced and competent with this skill if nothing else. Keep up the good work and practice to stay safe!

This article was re-produced from Fire Rescue 1

Michael Lee has 25 years experience in pre-hospital paramedic experience and about 20 years experience in the fire service. He started as a FF/Paramedic and worked up through the ranks, including training officer, to his current position as battalion chief. He currently serves as battalion chief at Mountain View Fire Protection District in Colorado. He is currently filling the role of safety officer for FEMA USAR Colorado Task Force One and has military service in the U.S. Navy. To contact Michael, email Michael.Lee@ FireRescue1.com







#### NFPA 1971: 2013 -Structural Fire Fighting Helmets



Peter Tarr
Pacific Helmets

The latest edition of the NFPA Structural Fire Fighting PPE standard is now up and running. This new edition will include changes to the performance and testing requirements of helmets intended for the US and other markets that have adopted NFPA standards.

nlike other international structural fire fighting helmet standards, such as AS/NZS 4067 and EN443, NFPA 1971 is a standard governing the certification of entire structural fire fighting PPE ensembles. Helmets are one component of this standard. While changes to physical testing processes are minimal, there are a number of amendments that are worth noting, particularly around the design and testing of optical helmet components, namely face shields/visors.

In relation to general requirements, the previous version of NFPA 1971 (2007) included a number of design and testing requirements for optical components. NFPA 1971: 2013 retains these requirements, but also stipulates that optical components must be tested to the requirements of ANSI Z87.1: 2010. There are marked differences between the technical performance requirements of NFPA 1971 and ANSI Z87.1. The wording in the previous version of NFPA 1971 was oriented more towards external face shields/visors mounted to 'traditional' style helmets. In the new edition, various amendments have been made to the optical testing requirements to reflect design changes including the increasing presence of 'jetstyle' helmets in regions where the NFPA standards have been adopted.

There are various other new requirements and amendments. Listed below are those requirements that are of greatest consequence to manufacturers and users.

#### **New Requirements**

#### Helmet Positioning Index (HPI):

Manufacturers are to stipulate the vertical distance from the lowest front lateral point to the mid-saggital plane. This effectively determines wearing height and allows the manufacturer to set this height relative to the design of its helmet.

#### Impact Resistance:

There is no change to the mechanical requirements; however, once tested, "helmets shall maintain sufficient structural integrity to withstand impacts in all 5 [impact] locations". This generally means the helmet should remain intact and not fall apart following the impact test(s).

#### Penetration Resistance:

There is no change to the mechanical requirements; however the following pre-test requirements make the test more severe:

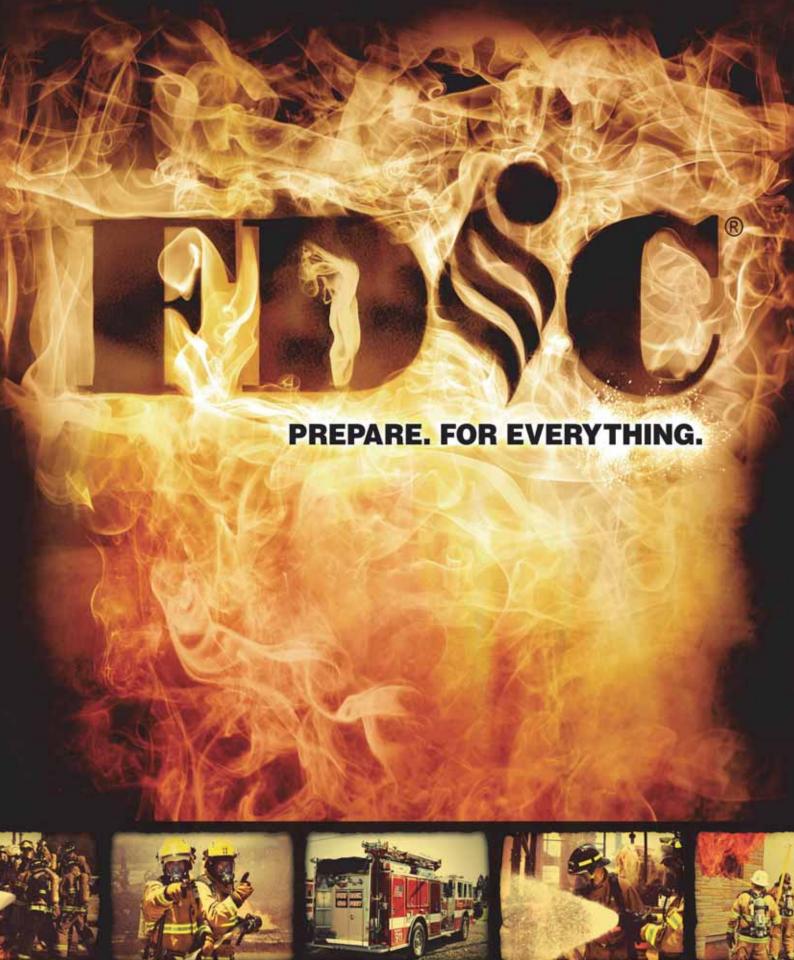
- All detachable face shields and/or goggles (whether internally or externally mounted) must be removed.
- Front crests/logo brackets, which could interfere with the testing and distort results, must be removed.
- Internally mounted face shield (where it is an integral part of the helmet) must be deployed (set to the 'in-use' position).
- The impact site shall be at least 75mm (3 in.) from the centre of a previous penetration or impact site.

#### Convective Heat Exposure:

- The back brim (of the helmet) must not droop more than 30mm.
- No component of the helmet assembly extending more than 30mm below the initial lowest point of the helmet shell in the front area, both before and after oven exposure. This test allows the inclusion of an internallymounted face shield. The previous requirement was that no component of the helmet assembly could droop below the brim and was oriented towards externally mounted face shields/visors.

#### Chinstrap Flame Resistance:

Velcro allowed but must face away from the







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## **HELMET STANDARD**

body or flash hood. This increases protection to the user.

#### Compliance to ANSI Z87:

The respective requirements for goggles and face shields/visors listed under ANSI Z87 must be met and marked "Z87+".

 Thermal Protective Performance for Neck Protectors/Shrouds/Ear Flaps/Covers:

Helmet shrouds are now included and must meet a TPP rating of >=20. Previously, only ear flaps/covers/neck protectors were included.

#### **Implications**

Although the changes listed are minor, with the exception of impact resistance pre-test requirements, these changes effectively now accommodate European 'jet-style' helmets with internally mounted face shields. The inference is not, however, that EN443 certified helmets will automatically pass the NFPA standards. There are some variations in the requirements of the three major international standards, AS/NZS 4067, EN443 and NFPA 1971. Each standard may have a test requirement(s) that is more demanding than similar requirements in another standard.

Pacific Helmets is the only helmet manufacturer that makes helmets that are certified to all three major international structural fire fighting helmet standards (AS/NZS, EN, NFPA). Consequently, conforming to these changes presents no difficulties for the company. Pacific ensures that the helmets currently made fall well inside the requirements of any standard and we welcome changes that bring increased safety to the wearers of our helmets.

Pacific Helmets is the only helmet manufacturer that makes helmets that are certified to all three major international structural fire fighting helmet standards.

The key advantage of achieving certification to multiple standards lies in the varied nature of the standards requirements across the three regions. Some tests that are specific to one region may be intended to simulate a particular situation that is commonly encountered in that region.

#### **Helmets Certified to NFPA 1971: 2013**

Pacific will be both updating existing models and launching new models to the new edition of the Standard.

The latest models to be released that will be certified to NFPA 1971: 2013 include the F3C/F4 range (and exciting new variants) and the F10 range. The F10 is a jet style helmet that features Pacific's patented One Touch automatic deploying eye protector that is quickly gaining popularity within the world's emergency services. The One-Touch eye protector will also be incorporated into these two on an on-going basis.

**Peter Tarr** is Client Relationship Manager at Pacific Helmets

For more information, go to www.pacifichelmets.com



## **Monitors - What to**

Akron Brass Style 3419 Apollo PE (portable electric) monitor combines high flow capabilities with a selfcontained battery and electronic control system



**Robert Avsec** 

Monitors will give more firefighting power without tying down personnel, so here is what to know before you buy.

Big water goes by many names in the fire service. Master stream appliance, monitor, water cannon, deluge set (gun), turret pipe and wagon pipe are just a few of the more common tags hung upon the equipment that firefighters rely upon when a big fire needs big litres-a-minute.

Monitors come in three types: those mounted on pumping apparatus: Type I or Type III engines or aircraft rescue and fire fighting (ARFF) units; portable monitors; and those mounted on aerial apparatus. Monitors on Type I engines may be permanently mounted or have the capability to be removed from the apparatus and used as a portable monitor. Monitors on ARFF trucks and Type III engines are also permanently mounted and can be controlled remotely by the apparatus operator while the vehicle is moving for pumpand-roll operation. Those monitors installed on aerial apparatus also tend to be permanently mounted with remote-control capabilities for the operator at the turntable.

## Lighter, Smaller, More Efficient

The major manufacturers have made great improvements in monitors' efficiency and have reduced portable monitors' overall weight. Engineers have used newer metal alloys to design monitors with a shorter and more efficient pathway from the piping or hose supplying the water to the point of discharge. That is why today's monitors, particularly portable monitors, have that short and stubby look when compared to monitors of yesteryear.

Hardwired electronic controls are typically found in ARFF units, Type III engines and aerial apparatus

applications. Remote control systems, using radio frequency and newer plug-and-play digital communication and control architecture, enable firefighters to control flow, stream pattern, and oscillation range from distances up to 400 metres away. This capability enables firefighters to set up the monitor and its water supply in the hazard area and leave it unattended while the flow rate, stream pattern, and oscillating range can all be set outside the hazard area.

Dual-purpose break-apart monitors can be used in a fixed position on the apparatus or as a portable monitor. When mounted on the apparatus, the operator control features for many of these newer monitors operates off of the apparatus' electrical system through a hot wire connection. The vehicle operator can control the monitor using a control box mounted on the apparatus or by remote control using either radio frequency or digital wireless technologies. Either is a highly desirable option in light of a provision in NFPA 1901(Standard for Automotive Fire Apparatus, 2009 Edition) which states:

"If a deck gun or monitor is to be mounted on the top of the apparatus, consideration should be given to designing the system so that it can be operated without the need for a person to climb to the top of the apparatus. This can be accomplished by using a remotely operated monitor or by positioning the device so it is operable from the pump operator's position."

#### Water to Go

When the same monitor is removed from its fixed position to be used as a portable monitor, an integrated battery-powered system enables the

## **Know before Buying**

firefighter to control the device remotely using radio-frequency or digital-wireless technologies.

Dual-purpose monitors have greater flow capacity – between 3,800 litres-a-minute and 5,700 litres-a-minute – when mounted on fire apparatus as well as a wider range of oscillation, up to 355 degrees of horizontal travel in some models. Once those same monitors have been dismounted from the apparatus, the available fire flow maxes out at 3,800 litres-a-minute; the range of oscillation also decreases to a maximum of 180 degrees once you lose the stabilising effect of the fire apparatus as a base.

One of the newest innovations in firefighting equipment is the quick attack monitor. These monitors are smaller than their dual-purpose cousins. Think of it as a really large nozzle at the end of 64mm attack line, and are designed for quick deployment.

But, what makes a quick-attack monitor a better option than a regular nozzle at the end of that hose? These monitors may be smaller, but they have many of the same characteristics as larger monitors: a ground base for stability, the ability to flow up to 1900 litres-a-minute and once in place can be left unstaffed as they operate. Quick attack monitors can be a real plus for situations like exterior exposure protection; once the monitor is in place, valuable firefighters can be deployed to other fire-ground tasks.

Both dual-purpose monitors and quick-attack monitors are also available with oscillating capability. These types of monitors use a water-driven motor – like an oscillating lawn sprinkler, only bigger – to create a fire stream that sweeps back

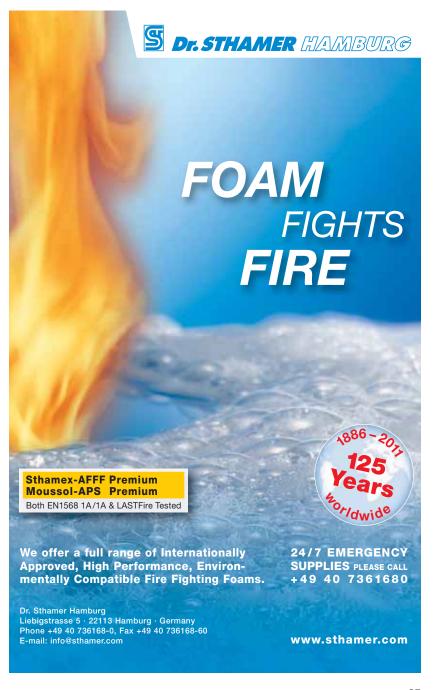
BlitzForce Personal Monitor flows up to 2000 litres-a-minute

and forth. Once in place, these monitors can deliver water flows between 1300 litres-a-minute and 3,800 litres-a-minute, making them a good tool for exposure protection or keeping tanks cool in a hazardous material incident.

If you have not taken a close look at the new generation of master stream monitors, now is a good time to do so. On-going reductions in departmental operating budgets and available staffing continue to put pressure on fire departments as they strive to provide quality services. Monitors just may bridge some of those gaps.

This article originally appeared in the November 2012 edition of FireRescue 1

Robert Avsec is a retired Battalion Chief with the Chesterfield, Virginia Fire & EMS Department



## PPV BUYERS' GUIDE



**Graham Collins** 

## What's New in PPV

With the greatly increased use of PPV, the leading manufacturers have boosted their research and development efforts to provide firefighters with the most efficient and reliable equipment. In this Buyers' Guide we highlight the latest offerings from the world's leading suppliers.

## Leader of the Pack

LEADER designs and manufactures high-technology, sturdy and consistently reliable PPV fans and related equipment and supplies them to fire fighting services mainly for use in positive pressure

ventilation applications. The company is established worldwide through subsidiaries, agencies and distributors.

Leader claims its Easy Pow'Air technology differentiates Leader from conventional and turbo technology competitors and results from a combination of advanced engineering techniques. Leader's Easy Pow'Air fans offer:

• Straight stream air flow: a very concentrated jet that uses all the air flow generated, producing exceptionally high air volumes – m<sup>3</sup>/h or CFM.

Greater air flow velocity: faster air flow allows the stream of air from the fan to "entrain" even more air and carry that entrained air into the structure. More air through the entrance point means more air out of the exit

point as documented Leader to AMCA-240-96R standards. They are most effective when placed between two metres and

six metres from an opening with the optimum between four metres

and five metres. This extended distance gives firefighters greater space and options for manoeuvrability. The fan can also be positioned as close as 900mm.

• Extreme air volume efficiency – almost all the "stream" of air from the Leader fan enters the structure to be ventilated

while over 30 percent of the air of conventional cone-of-air fans strikes the outside of the generally rectangular-shaped entry port and is therefore "blocked" from entering the structure.

- Higher PPV pressures: independent third party tests of Leader fans for pressurising stainwells and hallways to prevent smoke and heat and even fire from progressing into unaffected areas of the halls and stairwells have shown Leader Easy Pow'Air technology to be much more effective than larger fans using conventional technology.
- Quick and easy to position: the fan automatically tilts to a plus 10° optimal position when lifting the carrying handle. The tilt angle can also be adjusted to between plus 10° and plus 20°.
- Ventilation of special situations made easy: the option of repositioning the fan backwards, combined with the maximum tilt makes ventilation possible in applications including raised doorways, high windows, entries with steps and landings.

For more information, go to www.leader-group.eu



## **Look & Learn PPV Trainer**

Positive pressure ventilation is a powerful firefighting tactic when used correctly. With the HAAGEN Positive Pressure Ventilation (PPV) Trainer, it is now possible to conduct hands-on PPV training that is efficient and effective. The PPV Trainer allows you to challenge trainees to control doors, windows and roof vents on a number of floor plans to successfully ventilate a building.

Students can set-up fans, introduce smoke and control doors, windows and ventilation holes to learn the principles of PPV. Clear walls and red transparent doors allow students to visualise the air flow and learn to control ventilation. The PPV trainer is a modular system enabling a range of training opportunities.

- The PPV simulator comes as standard with a basement, first floor and roof for basic residential fire training.
- Add additional levels and choose from a number of floor plans for more advanced fire scenarios.
- The internal smoke generator with



on-board smoke fluid reservoir is located in the basement of the structure. Smoke channels built into each level are used to fill the entire structure or specific rooms with smoke.

- The handheld controller can be used to operate the on-board smoke generator and fans.
- All windows and doors are fully operational and ventilation holes are included in the roof.

- Internal doors are operated with cables and knobs mounted to the exterior of the floor.
- Choose from a number of floor layouts and create a customised model based on your training requirements.

Training opportunities include:

- Challenge trainees to use positive pressure ventilation to quickly clear a smoke-filled structure.
- Show trainees how to open and close windows, doors and vents for optimal results.
- Educate on proper fan positioning and the use of multiple fans for large openings.
- Demonstrate the advantages and limitations of both negative and positive pressure ventilation.
- Simulate strong wind conditions and challenge trainees to maintain control of building ventilation.
- Combine the PPV Trainer with the HAAGEN Desktop Flashover to demonstrate the dangers of flashover and backdraft when ventilating.

For more information, go to www.haagen.eu

## Industry's First Manufactured PPV



TEMPEST manufactured the first positive pressure ventilation fan in 1987. Since then, it has earned the reputation of producing only the finest, high performance and durable PPV/PPA fans in the world.

In 2013, that legacy continues with a full line of petrol powered, direct-drive and belt-driven fans, electric single speed and variable speed fans, all ranging from 406mm to 686mm. Tempest power blowers are the most used PPV/PPA fan in the United States, and can be found in operation across the globe.

The Tempest direct-drive petrol power blower offers an ideal combination of value,

performance and durability. All models features an overhead valve engine the delivers reliability and the high m<sup>3</sup>/h needed for aggressive positive pressure attack tactics. The Tempest belt-drive petrol power blower is the original PPV

fan and still the best for fire department applications. Offering the stability, durability and reliability that emergency services require, the Tempest belt-drives are the Rolls-Royce of PPV fans. Tempest Electric VSG power blower features the highest AMCA rated airflow for any electric fan able to operate on protected circuits.

The Tempest electric single speed power blower is built with the same durability and reliability as all Tempest fans but in an economic package. TEFC motors can be ordered in various voltages and come with the option for explosion proof motors designed to operate in Class I, Group C & D and Class II, Group F & G hazardous locations.

The Tempest 406mm smoke ejector is the standard for post knockdown negative pressure ventilation. Reliable, durable and simple, the Tempest smoke ejector is perfect for any department looking for value based NPV.

For more information, go to www.tempest-edge.com



## **PPV Revolution**

One major problem of Positive Pressure Ventilation (PPV) and Positive Pressure Attack (PPA) operations is that traditional fans create a cone of air that begins to diffuse typically between 1.2 metres and 2.4 meters from the blades.

That means in order to be effective the fan must be located as close to the structure as possible, and that location is usually also the primary access point.

Unfortunately, even small traditional PPV fans obstruct access, slow operations, and blast noise into a structure, but setting it farther back reduces performance. This trade-off problem has plagued firefighters since the adoption of PPV.

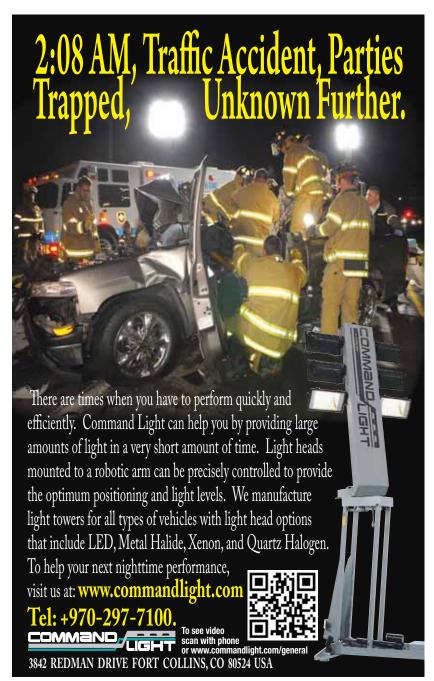
Ramfan is a brand of EURAMCO SAFETY and its Ramfan X-Series PPV fans solve that problem with the PowerStream – a straight beam of air that doubles operational setback distance to at least 2.4 metres to 4.9 meters without sacrificing performance. Extended setback allows easy access, eliminates the need to keep

repositioning the fan to accommodate traffic, and reduces motor noise inside a structure. This allows firefighters to get their jobs done faster so they can get home safely. Depending on the fan size, motor power and door shape, larger X-Series blowers can ventilate office buildings and warehouses from up to nine meters away.



Ramfan's PowerStream has revolutionised firefighting operations by allowing strategies and tactics unthinkable even a few years ago. PowerStream fans are also used in mine and tunnel ventilation, industrial maintenance, and aircraft wheel cooling. PowerStream is available only on Ramfan's X-Series: petrol-powered GX line, electric EX line, and trailer-mounted VX700.

For more information, go to www.euramcosafety.com



## Super Performer

The SUPER VAC VR3 is a variable speed, electric, positive pressure fan evolved from the popular VR2 model.

The VR3 is the only variable speed fan in the industry that will run on any 15 amp GFCI circuit and all new hydraulic generators without compatibility issues. It also offers precise control of air move-



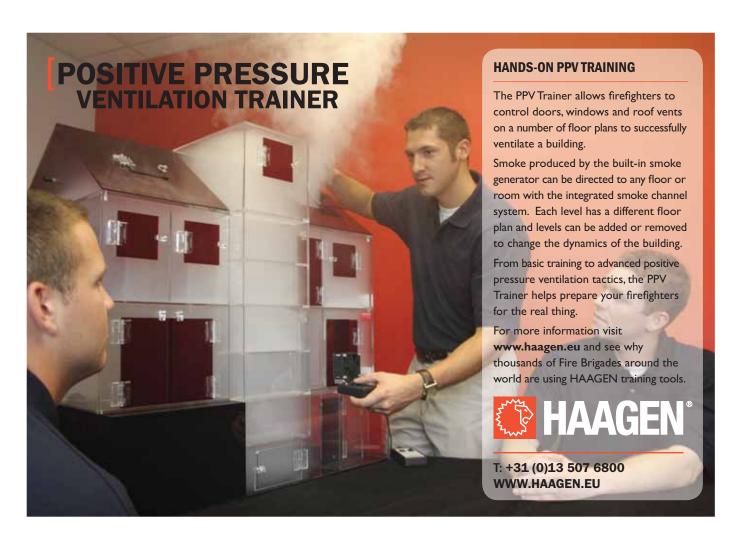
ment and up to 33 percent more airflow than single speed electric PPVs.

The heart of the VR3 is the famous Super Vac seven-point blade that creates a powerful cone of airflow. The cast aluminium aerofoil blade holds up better than plastic in the high radiant heat of structure fires. The VR3 maintains Super Vac's commitment to safety with its full roll cage frame that offers protection for the shroud and motor. The shroud can be tilted into four different positions from –10° to 20°. The frame features a powder coated finish that is made to last.

Transportation is easy with inboard mounted solid cushion tires that enable the user to go up and down stairs and manoeuvre corners with its "zero catch point" design. A step brake locks both wheels into position for a solid base while in use or in storage. A fold down handle makes the unit fit easily into smaller truck compartments.

The Super Vac VR3 is available in four sizes from 406mm blades for departments with smaller residential buildings, up to 610mm blades for departments with a significant number of commercial sized buildings. With a full line of accessories, the VR3 is the most impressive variable speed positive pressure ventilation fan on the market.

For more information, go to www.supervac.com





## **Russwurm Ventilatoren**

Made in Germany

...when mobile, compact but powerful fans are required.

Experienced in strongest fire and rescue situations. Used in vehicles which have to be equipped for all incidents. For every duty the right drive.

All versions are available with certified explosionproofness. We offer a wide range of ATEX-certified fans for the zones 1, 2, 21 and 22 in axial and radial design.

If required, they can be customized to your needs.



Get in contact with us and assure yourself of our capabilites.



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Centrifugal fans Axial fans Mobile fans Fan impellers Fan service

... and you have the air under control

# Confined Space Reare we?

Hand-operated Power Wedge combines extremely small insertion height with more than 25 tonnes lifting capacity





Ian Dunbar

Holmatro

"Confined Space" refers to a space, which by design has limited openings for entry and exit, unfavourable natural ventilation that could contain or produce dangerous air contaminants, and that is not intended for continuous employee occupancy.

he dangers of working in confined spaces were written about nearly 2000 years ago during the time of the Roman emperor Trajan (53-117AD.) He sentenced criminals to work in the sewer as punishment and the ill effects were noticed by the physicians of the day. In the middle ages, German scientist and scholar Georgius Agricola noticed that stagnant air in mines caused severe respiratory problems and in 1925 American toxicologist Alice Hamilton wrote that decomposition of organic matter produces hydrogen sulphide, noting this often proved deadly in confined spaces such as vats, tanks and manholes. So bearing in mind we have had two millennia to prepare for confined space rescue, just how ready are we?

Well, research carried out in the USA in the 1980s and 1990s would suggest that maybe we have not come as far as maybe we should have done. A US Department of Health and Human Services study, published in 1994 described

585 separate incidents leading to 670 fatalities (1980-89). Another study looking at confined space deaths from 1983-1993 reports the far more worrying statistic that of the 109 fatalities involved in confined space incidents, 39 (36%) were rescuers themselves.

Thankfully, the last 25 years has seen huge advances in search and rescue equipment and techniques coupled with greatly improved health and safety at work legislation, which has resulted in a reduction in the number of fatal incidents recorded. Despite this downturn, these types of incidents still occur more frequently than we would like, and for that reason we have to be prepared. We need to have mechanisms in place that allow us to react to such incidents and ensure a successful outcome.

### **Specialist Type of Rescue**

Confined space work is still an element of technical rescue that is not widely practiced and does

# scue: How ready

tend to be a specialist role (usually within the spectrum of urban search and rescue techniques) requiring additional skills and equipment. The dilemma facing rescue providers around the world is that because the window of opportunity for rescue is so very small how do you ensure adequate and timely provision of resources?

Of course, if every team that worked in confined spaces was self-sufficient in terms of rescue capability, this would go some way to relieving the burden on local first responders, but this is very rarely the case.

#### **Hazards**

There are two main hazard categories that can be associated with confined space work (and therefore rescue). The overview below details the main elements of the two categories:

#### **Atmospheric Hazards**

- Oxygen deficiency.
- Oxygen displacement.
- Flammable atmospheres.
- Toxic Gases.
- Solvents.

#### **Physical Hazards**

- Engulfment in loose material.
- Electrical/Mechanical machinery.
- Falling Objects.
- Temperature Extremes.
- Noise Exposure.
- Wet/Slick surfaces.

#### **Practical Problems**

Civilian work in confined spaces is now heavily regulated due to the hazards listed above. Emergency response into these areas also has to take account of these hazards. In addition to this, rapid access, travel, location treatment and packaging of casualties and swift exit, all have to be done in very difficult and challenging circumstances. All of the elements of rescue we take for granted 'above ground' are now compromised. No longer do we have unrestricted movement, a breathable atmosphere, clear communications and a wide selection of equipment, suddenly everything has changed.

### **Casualty Considerations**

Once the personal safety of the rescue team has been established, the focus then turns to the casualty. As with any other type of rescue, you must obtain as much information as possible regarding the mechanism of injury. This ensures that the team is adequately protected and does not fall foul of the same problems and also allows you to plan your extrication method prior to entry.

If your casualty is conscious, breathing and is able to answer your questions, this is an excellent source of information (and also gives an excellent indication of a patent airway, breathing, circulation and



Battery pump with next-generation battery technology

neurological status). However, an unconscious casualty means you have to rely on other information sources. No one working in a confined space should be working alone, and colleagues above ground should be able to provide you with more information.

Knowing where the casualty was working, their task, how long trapped/injured and any medical history will allow you to best plan ahead. With this information you can choose the appropriate extrication methods and relevant equipment before committing, saving vital time later in the rescue. Remember, "the golden hour" still applies, so the minimal medical intervention followed by rapid extrication is what will give your casualty the best chance of a favourable outcome. Prior knowledge of the relevant injuries and medical conditions associated with confined space work, will also allow you to assess and extricate your victim in the most appropriate time.

### **Training**

We need to understand that confined space rescue is a high risk, low occurrence event. It is fair to say that we feel more confident at tackling the low risk (relatively speaking), high occurrence events such as road rescue. Simply put, the more of one type of incident we attend, the more capable we become. We should always identify these types of occurrences and design our training accordingly. Too many rescuers have become victims of confined space incidents and the inability to identify hazards and control the risks have contributed to the vast majority of these deaths.

Approach to confined space rescue will vary across the world. There will be different levels of resources in terms of team members and equipment. Also local, regional and national guidelines will dictate what your standard operating procedures are. The analysis of your local risks should be the starting point for your preparation, as this

## **CONFINED SPACE RESCUE**

Emission-free battery pump suitable for use in collapsed buildings



knowledge will allow you to specifically ensure to have the right equipment to deal with any eventuality you foresee.

The intervals at which you train are also very important. A lot of research has been done into the subject of skills fade. Some studies suggests that more complex tasks, requiring analysis and decision making requires a different approach to simple repetitive practice, and it is important to increase the understanding of the underlying principles involved.

### Equipment

There was once a time when rescuers had a small inventory of tools that had to be used for all manner of applications at operational incidents. The nature of rescuers means that problems are very quickly overcome, and in fact tools were modified to make them more suitable for a wide range of uses.

One result of this inventiveness is that it has largely paved the way for the tools we have available today. Tools that are not only modified, but actually designed and constructed with the sole intention of working in confined spaces, allowing rescuers to overcome some of the practical problems and hazards involved.

## Self-Contained Tools and Battery Technology

Above ground in open, well lit, well ventilated and spacious areas, conventional tools (hydraulic rescue tools with hose and pump) will always be the number-one choice for rescuers throughout the world. The use of single hose technology and couplings that allow tools to be changed under flow has greatly assisted emergency responders in reducing extrication times and making the process

safer and easier. For some confined space rescues this equipment may well be your first choice. However, in the vast majority of cases, certainly where deeper penetration is required, we have to look for alternatives.

Confined space rescue does not permit limitless resources. Entry of rescuers into the affected area will be limited, for obvious reasons. This limit of personnel also means there is a physical limit to the amount of equipment that can be taken. So the equipment has to be really compact, light, well designed and easy to use. Ironically, the equipment required at these types of incident tends to be bigger and bulkier than its above ground equivalent.

For that reason, the development of self-contained tools means that you now have the possibility to lift, cut and spread in confined spaces using tools that are small, light and compact, with no need for a separate pump and hose. These types of tools can be split into two categories: hand-operated and battery powered.

Hand-operated cutters, spreaders and wedges have and integral two-stage pump that requires relatively little force to operate. The fold-away handles are rotatable through 180 degrees and can be used in any position and adjusted at any time, even during use, when the tool is under pressure. Despite the fact that they are hand controlled, they still operate at 720 bar and have impressive lifting, cutting and spreading forces.

Battery operated tools are excellent for rapid intervention during remote and confined space work. Light (15kg) and compact, they offer the rescuer further options.

Now you also have the option of making your existing tools battery-driven by use of a battery-driven hydraulic pump. This revolutionary technology allows your tools to be used in any environment, and as there are no emissions, they are perfect for confined space work. The batteries in these units have tremendous power and will operate for 90 minutes during normal rescue operations. Offering three-stage technology, they provide higher oil flow, meaning increased tool speed. They are quiet, making casualty identification and subsequent care much easier and safer.

Remember the value of pneumatic equipment at incidents in confined spaces. For example, high pressure airbags capable of lifting five tons weigh as little as two kilogrammes and give a lift/spread of 150mm.

### Conclusion

The risks of working in and rescuing from confined spaces are well known and well documented and for this reason, this type of incident is foreseeable. Despite advances in safety, dedicated tools and improved techniques, the nature of this type of environment means that your skills, equipment and resources will be severely tested and your casualty still requires rescue in a safe timely manner, in line with "the golden hour".

As with any kind of rescue scenario preparation is your strongest weapon if you are to overcome the hazards and risks involved. Training at regular intervals, choosing equipment that is specifically designed for this purpose and having the underpinning knowledge is the only way to manage the risks associated with confined space rescue, and ensure you do not become another statistic.

lan Dunbar is a Rescue Consultant at Holmatro

For more information, go to www.holmatro.com







# -Gutters Edge®

ISO-9001 Certified FIRE RESCUE SAWS

The "Next Generation" Technology of Cutters Edge Rescue Saws are here and are designed and built to deliver 100% reliable, high performance cutting in the most demanding and extreme conditions encountered by Fire Rescue Personnel

## **New 2172 MULTI-CUT® Rescue Saw**

The "NEXT GENERATION" CE2172RS features a new technology

engine that produces 10% more Horsepower with higher torque! It also emits fewer emissions and is more fuel efficient.





New Illuminating Handle Option Available on All Saws.

## **New Gas Powered Concrete Rescue Saw**

The New CE94CRS Gasoline Powered Concrete Cutting Chainsaw cuts reinforced concrete up to 16-inches thick and cuts it up to 40% Faster with the new

CE7COI™ Diamond Chain that features diamond cutting segments on every chain link – up to 30% more diamond cutting surface area in contact with the concrete being cut.

## **New Rotary Rescue Saw**

The CE970 H<sup>1</sup> Series Rotary Rescue Saw has a new, more powerful 94cc engine for high performance cutting. A new Air Filtration System, incorporating a special waterproof K&N Filter, assures outstanding performance in all cutting conditions. Exclusive Black Diamond and Black Star cutting blades cut a wide variety of materials.



Fully Equipped Sawing Kits are Available for All Three Saws



FIRE RESCUE SAWS

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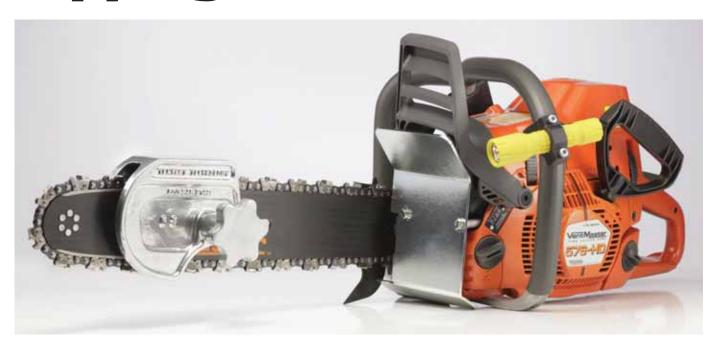


**Graham Collins** 

# Making the Cut

Selecting the right rescue saw can, literally, mean the difference between life and death for the trapped victim. In this Buyers' Guide we aim to show what is new on the market from the leading brands around the world

# **Ripping Success**



VentMaster chainsaws from TEMPEST are designed specifically for firefighters and the daunting demands that come with the job.

Cutting tools in the fire scene must be able to cut a wide array of materials, often while running full-throttle in extremely harsh conditions such as high heat and thick smoke. These scenarios can destroy a standard chainsaw. Equipped with the Husqvarna Pro X-TORQ 576XT or 365XT power head, VentMaster cobalt guide bar and Raptor carbide chain, VentMaster chainsaws are able to rip their way through everything from car bodies to green trees. The saw's exclusive air filtration design allows it to tackle all of this even while taking in heavy smoke, heat and debris.

The X-TORQ power head increases torque up to 20 percent over a wider rpm range for maximum cutting power. The Husqvarna power head features larger displacement, the highest fuel economy in its class, higher peak power and far superior ergonomics. An exclusive air-injection, centrifugal force air cleaning system eliminates the need for expensive external

aftermarket filters. Preliminary air intake cleaning rejects 97 percent of cutting residue and other airborne debris including drywall dust, concrete dust, smoke and even water spray. Cleaner intake air means longer intervals between filter cleanings, longer runs at full power, longer chain life, smoother operation and reduced internal engine wear.

Cobalt alloy inserts featured on the end of the guide bar provide fantastic wear, galling, and impact resistance. The properties are retained even at high temperatures. The Raptor carbide chain features an "open dual-raker" design protecting the cutters and allowing greater cut control. Tough enough to cut through tar, asphalt roofing, nails, sheet metal and wire enforced belting, yet versatile enough to cut trees and green wood.

The tool-less KIS-40 depth gauge is fast, simple to install, adjust and remove and eliminates the need to "roll the rafters". Accurately control cutting depth protects the operator and performs speed cuts safely. A one step start/stop combines the choke, throttle lock and stop switch, eliminating flooding and allowing fast, convenient starting. VentMaster chainsaws feature easy one push positive stop, even when wearing gloves.

For more information, go to www.tempest-edge.com

# **New Technology Power**

CUTTERS EDGE has introduced the next generation engine technology for more power, more torque, better fuel efficiency and 75 percent fewer emissions to its line of fire rescue saws. The new Stratified-Charged Dual-Air intake engine technology significantly improves overall cutting performance and meets all Air Quality

Control standards at

the same time.

In addition to the new engine technology, Cutters Edge also added reflective labels on all saws and offers an illuminating handle option to help see the saws and operators in dark and smoky conditions.

Designed specifically for the fire and rescue industry, the new 2100 Series includes two engine sizes: 70.7cc and 87.9cc. Each engine is designed for use with the Cutters Edge carbide-tipped bullet chain and will cut the widest range of materials found at a fire ground and rescue scenes. The bullet chain's unique design and filing action cuts faster and lasts up to 20 times longer than standard

chains. Certified tests show it is the safest carbide-tipped chain, with "extremely low kickback"

kickback".

Cutters Edge exclusive external multi-

stage air filtration system enables its saws to run up to 12 times longer in hot (up to 593°C) and smoke filled environments and a full-wrap handle ensures high performance cutting in any position.

The new H<sup>1</sup> Series is engineered and powered to work harder and operate longer in the most extreme fire and rescue conditions throughout the world. The new technology engine is available in three sizes: 74cc, 94cc

and 119cc. A multi-stage air filtration system maintains smooth, continuous performance in any condition and an optional full-wrap handle assures high performance cutting in any position.

Two High-Performance Diamond Cutting Blades are available on the H<sup>1</sup> Series. The Black Star and Black Diamond offer a choice of longer cutting life, 150 to 300 times longer than standard blades, and high speed cutting of virtually all materials. An advanced vacuum brazing process permanently fuses the cutting diamonds and exposes 30 percent more diamond

Cutters Edge's new CE94CRS gasoline powered concrete cutting chainsaw is powered by a new technology 94cc engine and cuts reinforced concrete up to 40.64cm thick with its diamond chain. The new lighter weight Powerhead and redesigned full-wrap handle enables high performance cutting in any position and the waterproof air filtration system assures dependable performance in any conditions.

cutting surface for faster cutting and longer life.

A new diamond cutting chain, the CE7COI diamond chain, features diamond cutting segments on every chain link – for up to 30 percent more diamond cutting surface area in contact with the concrete being cut. The CE7COI diamond chain cuts substantially faster, has significantly less vibration and excellent longevity.



For more information, go to www.cuttersedge.com

## **High Power Reliability**



horsepower Dolmar engine. This 78.5 cc engine features the new SLR function that lowers emissions for a cleaner environment.

The SV3 also features a three-stage heavy-duty air filter that is proven during the smoky conditions in which a firefighter will be working. The full wrap handle and .404 heavy-duty carbide chisel chain makes this saw quick through the cut. It is easy to handle and tough enough to tackle a variety of operations, including cutting through residential roofing, removing downed trees, and ripping through various building materials.

A D-ring handle makes it easy to start while wearing multilayered rescue gloves. A scrench tool and holder on the saw makes for quick adjustments and the front faceplate deflects debris. A quick start compression release and an "always on" ignition ensure the SV3 is ready to go when you are.

Super Vac reckons to be the only manufacturer to offer two different style depth guards. A full wrap style comes standard for extra safety and a quicksilver open style is available if you are looking for the lightest depth guard on the market. Additional accessories are available to help make the SV3 Power Pro chain saw the perfect ventilation chain saw for the fire and rescue industry.

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The FR3 diamond blade from HUSQVARNA has a single layer of vacuum-brazed diamonds that ensures outstanding cutting performance in a wide variety of materials.

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The FR3 diamond blade offers superior cutting speed and is safer to use than abrasive discs in power cutters and angle grinders when undertaking either fire and rescue or urban search and rescue operations.

For more information, go to www.husqvarnacp.com





# Modern Road Traffic Management an Irish Perspective

## **Stephen McEnroe**

Athlone Fire and Rescue Service

The Fire Services in Ireland are managed at local authority level, with the Department of the Environment, Heritage and Local Government playing an advisory, legislative and policy-making role. There are approximately 3,300 firefighters employed in around 216 stations.

The service comprises full-time and retained personnel. Retained fire crews make up about two-thirds of the national total and are recruited in most towns and rural areas. They are available for emergencies at all times via a paging system. Cities and larger urban areas are serviced by full-time firefighters, who work in shifts to provide a 24-hour on call service.

The main responsibilities of the fire services are:

- Attending and extinguishing fires.
- Special service incidents:
  - Road traffic accidents.
  - Water pumping and flooding.
  - Rescuing persons from water.
  - Non fire rescues.
  - Miscellaneous.
- False alarms.
- Ambulance calls.

This article is concerned with the special service incidents category, primarily Road Traffic Accidents (RTAs). The proportion of RTA calls in the overall workload is displayed in Table 1. This Fire Service

involvement is a significant component of our total responsibilities.

At Road Traffic Accidents the fire service endeavours to rescue casualties while ensuring a safe and structured approach. Geographical, time and safety constraints merge to make this task very difficult, especially on rural roads. Ultimately there are fatalities as a result of some of these incidents. Statistics are the key measures of progress in road safety and unfortunately fatalities are the best indicator of performance when it comes to road safety.

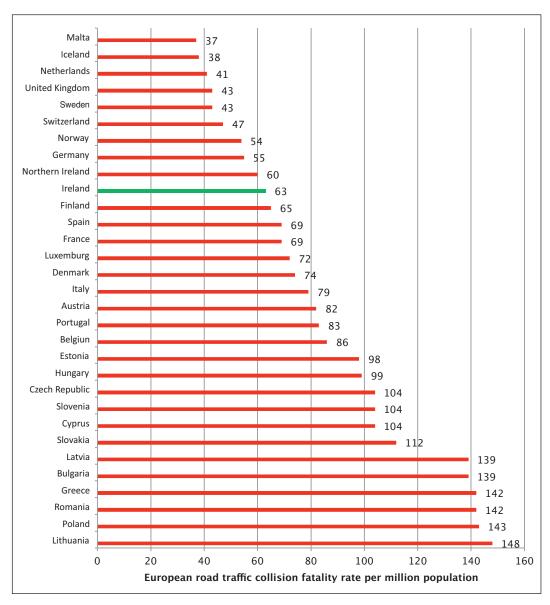
Road Traffic Accident (RTA) work in Ireland has undergone many changes in recent years. In June 2009 a new 'Road Traffic Accident Handbook,' was compiled by the National Directorate for Fire and Emergency Management, in order to provide an updated, uniform, systematic approach to road traffic incidents. It endeavours to give guidance to firefighters in areas where little guidance had previously existed. Prior to the publication of this handbook, a great deal of RTA training was based

Table 1. Particulars of Provincial Fire Brigade Activities including Dublin)

Province in Ireland (and Dublin)	Fires attended by Brigades	Special service incidents						False alarms	Ambulance calls	
	Total (a)	R.T.A's	Water pumping/ flooding	Rescue persons from water	Other non-fire rescues	Misc.	Total (b)	Total (c)	Total (d)	Total a+b+c+d
Leinster	7941	1375	465	61	251	753	3015	1792	0	12742
Munster	8128	1046	283	138	330	1100	3006	2330	0	14059
Connacht	3375	875	86	41	90	268	1400	790	0	5565
Dublin	18048	1141	276	64	672	1147	3458	1807	83736	107049
Total	37492	4437	1110	304	1343	3268	10879	6719	83736	139415

## ROAD TRAFFIC ACCIDENTS

Figure 1 Road Fatalities per Million Population in 2008. Road Safety Authority's, Road Collision Facts, Ireland 2008)



on instinctive evidence, with little research-based evidence available to brigades.

#### **Road Traffic Statistics**

Since the early 1990s valuable research has been published into road accident injuries, both in the U.S.A. and Europe. Every year in the European Union road traffic collisions account for more than 40,000 fatalities and 1.7 million injuries in 1.3

million registered vehicles was 303. By 2008, the rate had fallen to 112 per million registered vehicles. In 2008, of the 28,464 Garda-recorded motor vehicle traffic collisions, 279 people were killed, 9,758 people were injured of which 835 were seriously injured, and 21,728 collisions involved property or material damage only. The fatality rate per million population was 63 in 2008 (Figure 1), a decrease of 19 per cent from the

# The Fire Services in Ireland comprises full-time and retained personnel. Retained fire crews make up about two-thirds of the national total and are recruited in most towns and rural areas.

million accidents. Although most crashes stem from driver error, Europe's national safety strategies show that safer road design and layout would do most to reduce the rate of death and serious injury – especially in countries where messages about better driver behaviour and safer vehicles are generally understood and accepted.

In Ireland in recent years, road deaths reached a plateau between 340 and 390 until 2007, but had fallen in 2008 to historically lowest annual fatalities since 1959. In 1998, the fatality rate per

2007 rate of 78. The estimated cost of all road collisions reported to, and recorded by An Garda Síochána (the Irish police force) in 2008 was €1.2 billion. This is a reduction of 12.7 percent since 2007.

Figure 1 highlights Ireland's relative position in a European study of fatal road traffic accidents per million population. With 63 fatalities per million Ireland is better than European average but lags behind the safer road systems of Sweden, the United Kingdom and Netherlands.

Yearly statistics can be further examined and

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For over 120 years Ziegler has stood for innovation in fire fighting solutions.













## **ROAD TRAFFIC ACCIDENTS**

Table 2 An Garda Síochána, Fatalities and other Traffic Statistics 2012)

Monthly Comparisons 2003–2012													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	Totals
2003	20	21	33	23	28	37	32	26	20	34	30	21	335
2004	32	36	25	27	26	36	38	35	34	22	29	34	374
2005	33	37	26	23	41	22	41	24	31	43	34	40	396
2006	40	31	27	37	30	32	38	17	23	32	27	31	365
2007	22	25	34	30	24	29	31	28	28	26	23	38	338
2008	25	32	20	19	09	28	26	28	19	22	22	19	279
2009	18	15	24	20	28	15	19	20	14	22	25	18	238
2010	15	14	12	19	28	11	21	19	13	36	14	10	212
2011	21	18	15	08	11	15	18	16	13	15	18	18	186
2012	13	14	13	18									58

Table 2 classifies fatal road accidents per calendar month for the years 2003 to 2011. Firstly it can be summarised that the yearly total is demonstrating a welcome steady reduction from 335 in 2003 to 238 in 2011. This must be taken in context with a yearly increase in registered vehicles so the reduction in fatalities is a significant improvement.

### Current Critical Success Factors for Road Safety in Ireland

In January 2006 the Irish Prime Minister set up a Cabinet Level Committee on Road Safety chaired by the Minister for Transport and attended by five other Ministers and their supporting officials. This structure mirrors political arrangements in best practice countries. Arising from this committee, a new body known as the Road Safety Authority (RSA) was established. The RSA is now the primary organisation responsible for advising and

the implementation of the Road Safety Strategy 2007 to 2012 The current critical success factors for road safety in Ireland can be categorised into nine separate areas, as per the "SARTRE Report & Millward Brown Study" these are:

- 1 Political commitment.
- **2** Road Traffic and safety provisions.
- **3** Garda traffic corps.
- 4 Legislation.
- **5** Funding.
- 6 On-going consultation process.
- **7** Public support.
- **8** Road engineering.
- **9** Media support.

The Irish fire service is positively contributing to many of these success factors namely road traffic safety provisions, supporting the Garda and engaging in many media activities including the education of our younger road users in safe driving practices.

Road traffic accident work in Ireland has undergone many changes in recent years. In June 2009 a new 'Road Traffic Accident Handbook,' was compiled by the National Directorate for Fire and Emergency Management, It endeavours to give guidance to firefighters in areas where little guidance had previously existed.

evaluating road safety policy. Concurrently, An Garda Síochána established the Garda Traffic Corps, with the appropriate supporting command structure, equipment and resources. A significant strengthening of the legislative framework for road safety, including measures such as increased penalties, court fines, and disqualification periods are now in place.

Dedicated funding is available for the work of the Road Safety Authority (RSA), National Roads Authority (NRA) and the Garda Traffic Corps. This brings together the funding for critical road safety interventions over the lifetime of the Road Safety Strategy 2007 to 2012. Building on the success of initial consultations, the RSA has committed to an on-going consultation process with key stakeholders and other interested road safety practitioners during

#### Areas for Improvement – Relationship Between Rural Roads and Road Traffic Collision Fatalities

According to the Road Safety Authority's, 'Road Collision Facts, Ireland 2008', twenty-eight percent of all fatal collisions in 2008 occurred on urban roads. The percentage of fatal collisions occurring on rural roads is significantly higher than those occurring on either national roads or in urban areas.

On a county by county basis, relatively sparsely populated, rural counties such as Longford, Donegal and Mayo all experience a greater number of fatalities per million population, compared with other more densely populated counties. There appears to be a relationship between rural road collisions and fatalities occurring in these areas

## ROAD TRAFFIC ACCIDENTS

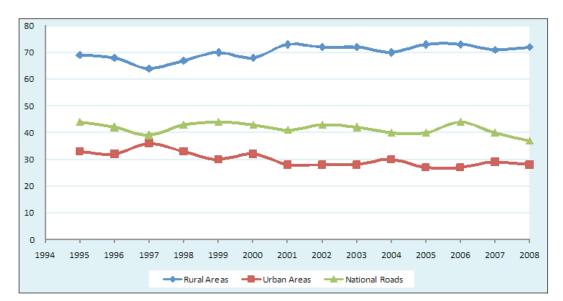


Figure 2. Percentage of Fatal Collisions in Rural, Urban Areas and on the National Routes, 1995-2008. Road Safety Authority's, 'Road Collision Facts, Ireland 2008)

compared with urban areas. The results obtained collectively point to the need for specific strategies and technologies designed to alert drivers and other road users to hazardous traffic flow and potential non-traffic road hazards, especially on rural roads.

One exciting technology area for improving the RTA statistics in rural areas is in the potential use of Intelligent Transport Systems. This term refers to information and communication technology systems that improve transport outcomes such as transportation safety, efficiency, timely travel and

capabilities toward intelligent transportation systems.

While the primary focus of large scale ITS is the improvement of traffic flow and reduction of congestion in urban areas, there is considerable potential for adapting the principles and technology of ITS to create smart traffic information systems, which would be of benefit on smaller roads. The authors and academic researchers in Athlone Institute of Technology are actively investigating intelligent traffic management systems which aim to improve road safety in rural areas.

Fire Service personnel are available for emergencies at all times via a paging system. Cities and larger urban areas are serviced by full-time firefighters, who work in shifts to provide a 24-hour on call service. There are approximately 3,300 firefighters employed in around 216 stations.

informed travel choices. Intelligent transport systems vary in technologies applied, from basic management systems such as car navigation and traffic signal control systems to more advanced applications that integrate live data and feedback from multiple sources.

EU Directive 2010/40/EU, which deals with the deployment of Intelligent Transport Systems in the field of road transport, defines an Intelligent transport System (ITS) as a system "in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport".

ITS comprises sensing systems, communication and computational technologies. Sensing systems for Intelligent Transportation Systems can be vehicle-based or infrastructure-based networked systems, enabling intelligent vehicle technologies. A number of forms of wireless communications technologies have been proposed for intelligent transportation systems to date. Technological advances in telecommunications and information technology, coupled with state-of-theart microchips have enhanced the technical

### Conclusion

The fire service is the initial emergency response agency. It is called to all manner of road traffic collisions on all types of road class. With the majority of accidents occurring on rural roads this makes its job more difficult, because of the geographical location. Most brigades are stationed in centres of population where the infrastructure is generally good and the road network is well maintained. However, the further outside these centres of population the poorer the condition of the road network, hence the more frequent collision rates.

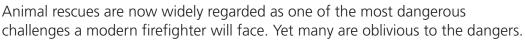
While Ireland is adopting successful strategies, being driven by the Road Safety Authority, to reduce the number of fatalities and injuries on the country's roads, the number of collisions taking place on rural roads is still quite high. One of the key factors in this is the quality of rural roads in many places. Intelligent Transport Systems are employed worldwide for the improvement of traffic flow and reduction of congestion in urban centres. Adaptations of these system technologies can form the basis of traffic information systems, which may be successful in alerting drivers on rural roads to the presence of oncoming traffic or other hazards. The authors are currently developing such a smart system.

Stephen McEnroe is a Sub-Station Officer at Athlone Fire and Rescue Service, Dr Paul Archbold, Dr Damien Brady and Dr Carmel Kealey are Lecturers in AIT and co-supervised the work

For more information, go to www.ait.ie

## **Animal Rescue**







James Morton
Hampshire Fire &

Rescue

"The trouble is that animal rescue is traditionally seen as a soft humanitarian service," sighs Jim Green, one of the UK fire service's leading experts in the field. "In every area of the world there is a need for improved awareness and training in order to deal with animal incidents."

The image of firefighters scaling a ladder to rescue an over-adventurous kitten from the upper boughs of a sturdy tree is one Jim is keen to eradicate. While a cute cat in the arms of a brave crew member might provide a heart-warming image for the public, the sharp end of animal rescue for the world's firefighters is starkly different. A horse trapped in a cattle grid or a distressed cow stuck in a slurry pit provides a challenge on a par with any fire or car crash. The rescue or release of animals in such scenarios can take hours of painstaking preparation and execution.

Jim has been part of a team from Hampshire Fire and Rescue Service in the UK leading a crusade to improve the animal rescue training of firefighters across Europe. Hampshire is the largest county in south-east England and an overwhelmingly rural landscape. It is dominated by national parks — the varied woodland and heath of New Forest to the west and the rolling chalk hills of the South Downs to the east — as well as having an extensive coastline.

Animal rescue has become a way of life for the county's firefighters. In 2004 specialist animal rescue posts were established in Hampshire and in 2008 Hampshire Fire and Rescue Service was asked to establish a UK-wide committee to share best practice and support the development of techniques.

The Chief Fire Officers' Association (CFOA) Animal Rescue Practitioners' Forum is mandated to raise the understanding and awareness of animal rescue and establish national standards and protocols. Such has been the success of the UK's approach that interest from the rest of Europe for its knowledge and expertise has been growing.

"The international community needs to consider similar procedures and joined-up thinking," says Jim. One of the key factors in the UK's success has been the development of strong links with the nation's veterinary associations. The aim is to engage with practitioners that fire crews work with so closely on animal rescues. "This type of incident relies heavily on a partnership approach with large animal vets, who should be at the centre of anyone's response model," says Jim.

Along with Professor Josh Slater from London's prestigious Royal Veterinary College, Jim recently attended the European Vets Conference in Amsterdam to speak to practitioners from across the continent. Assisted by Belgian fire officer, Tom Van Esbroeck, and his team from Ghent, that had previously been to England to be schooled in the UK approach, Jim gave demonstrations of equine and large animal rescue to large crowds at Amsterdam's RAI centre and ran seminars for vets in rescue and trauma care.

"Internationally, there is not a culture of vets working with emergency teams," says Jim. "Many of them express trepidation at being called to major incidents. Training gives vets confidence in their role at the scene and how to fit seamlessly into our standard operating procedures. It is important the two skill sets come together to work in a similar way to the way crews do with medical colleagues."

Jim's Hampshire colleague, Anton Phillips, was then invited to Vienna to open up the subject of large animal rescue and working closely with vets to an Austrian audience. "It's pretty common for firefighters in Austria to be called to rescues large animals, particularly horses, even in a city like Vienna," says Jim. "Both vets and firefighters were extremely keen to learn about the sort of skills they need to deal with these rescues." Hopefully, Anton's visit will be the catalyst for the development of robust training opportunities for them.

While keen to stress the benefits of working with vets, another crucial element of the training was to distinguish between the role of the vet and the role of the firefighter. "There is an expectation that vets or owners will know what to do when it comes to animal rescue," says Jim. "But vets have little training in rescue and owners tend to get

emotionally involved, so it is essential that firefighters have a level of knowledge that will promote a safe scene and lead to an effective tactical plan."

The quest to develop animal rescue across Europe has now spread as far as the southern Turkish province of Sanliurfa. While the gravity of animal rescues has been put into perspective as the border province becomes caught up in the conflict unfolding in neighbouring Syria, the area's firefighters were desperately in need of training.

"The area had just suffered major flooding and many of its animals, which are crucial to the local economy, were drowned, swept away or left trapped in precarious positions," says Jim. "The farmers down there have very little and so an animal stuck in a drainage channel can be a really significant issue to them. But they don't currently possess the skills to rescue that animal in a safe manner."

The sharing of expertise across Europe has already seen firefighters from Norway, France, the Netherlands and Austria introduced to formal animal rescue techniques and procedures. Belgium went a step further, fully adopting Hampshire's standard operating procedure for animal rescue.

Thanks to the tireless work of Jim and the members of the CFOA animal rescue forum, the message appears to be hitting home at an interna-



tional level. At last summer's London Olympics, Jim was invited to advise the cross-country vet services team at the equestrian events in the case of an accident or emergency. Stationed on the cross-country course in picturesque Greenwich Park, it was considered a major breakthrough that organisers had asked for a dedicated rescue specialist.

"We are now starting to see the legacy of integrating these skills," says Jim. "Things can go wrong anywhere that animals and humans interact; whether at a small country show or a major sporting event it is about getting people working together as a prepared team with the right equipment and skills. Everyone needs to be ready to deal with unforeseen events and the right resources need to be in place."

It would be foolish to underestimate the emotive nature of the public's relationships with animals. A survey in the USA concluded that 83 percent of people would risk their lives to save an animal. But it is hoped that by sharing tried and tested techniques and knowledge with Europe's fire services, the likelihood of injuries or even death to members of the public will be greatly reduced. There is still work to do but the impact of Hampshire's experts is now being felt at all levels across the continent.



James Morton is Senior Communications Officer, Hampshire Fire & Rescue Service

For more information, go to www.hantsfire.gov.uk

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DX1090	Nonionic						
DX1025*	Anionic			_	_		
DX1026*	Anionic		•		•		
Foam Stabilizers							
DX5011	Anionic	-		_			
DX5022	Anionic	-		-			
DX5065**	Anionic	-		-	_		
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\*\* Blend of Fluorosurfactants and Foam Stabilizers



# The Impact of PV Systems on Firefighting

The use of photovoltaic (PV) systems as an energy-generation source is growing at a rate of 30 percent annually due to government incentives and rising energy costs. As a result of greater utilization of PV systems, traditional firefighter tactics for suppression, ventilation and overhaul have been complicated. This leaves firefighters vulnerable to potentially unrecognised exposures, particularly due to risk of electrocution. Though the electrical and fire hazards associated with electrical generation and distribution systems are well-known, PV systems present unique safety considerations.

**Robert Backstrom** 

**UL Fire Hazard Group** 

nder the United States Department of Homeland Security (DHS) Assistance to Firefighters grant, fire service concerns of interacting with PV systems during suppression, ventilation and overhaul operations was investigated. The objective of this work was to document firefighter vulnerability to electrical and casualty hazards when mitigating a fire involving PV modules and support systems.

A technical panel consisting of representatives from the fire service and PV industry was assembled to provide input to the research team.

Design of the experiments was based on the PV system being exposed to a fire and the resulting hazards for firefighters. The research included experiments to develop empirical data for under-

standing the magnitude of these hazards and unsafe conditions, including:

- Assessment of PV power using a variety of light sources.
- Shock hazard due to severing of conductors, and assessment of potential shock hazard from damaged PV modules and systems.
- Shock hazard due to the presence of water and PV power during suppression activities.
- Shock hazard due to the direct contact with energized components during firefighting operations, emergency disconnect and disruption techniques.

To aid firefighters understanding of the significance of the results of this project, hazards were quantified into four levels:



- Safe: for conditions where the current through the body would be 2mA or less, the results would be considered safe, as that is a level of DC current considered to be below the threshold of perception. In this Report, this is represented by a green highlight and/or the word "Safe."
- Perception: for conditions where the current through the body would be greater than 2mA, but not greater than 40mA, the results would be considered unsafe, as that is a level of DC current where it is possible for a person to perceive the presence of electricity, and this could result in a startle reaction that could result in a serious injury. In this Report, this is represented by a yellow highlight and/or the word "Perception."
- Lock On: for conditions where the current through the body would be greater than 40mA, but not greater than 240mA, the results would be considered dangerously unsafe, as that is a level of DC current where it is possible for a person to loose muscle control and possibly lock on to the source of electricity. This could result in the cessation of breathing and asphyxiation. In this Report, this is represented by an orange highlight and/or the words "Lock On"
- **Electrocution:** for conditions where the current through the body would be greater than 240mA the results would be considered very serious and dangerously unsafe, as that is a level of DC current where it is possible for a person's heart to stop beating in a normal manner, and death would result if successful defibrillation was not possible. In the Report, this is represented by a red highlight and/or the word "Electrocution."

## Assessment of PV Power with Various Light Sources

Sunlight is the main source of illumination for a PV system, but the ability of other sources of light to energise a PV system has been unknown. Therefore, experiments were conducted using artificial light from fire trucks that used scene lighting during a night-time fire event, light from an exposure fire, and light from a low ambient source, such as a full moon.

If a fire is burning on or near a roof that has PV modules installed, a concern is that light from the fire could produce enough illumination to cause the PV array to produce a hazardous level of electricity. Two of the PV framed modules (230W, nominal 37V open circuit, 7.5A short circuit) were mounted side-by-side on a mobile cart that could be moved various distances in a dark room overhead lights only left on for egress.

It is often assumed that once the sun sets, the PV system is no longer generating electricity, and thus no danger of an electrical hazard is present. To validate, an experiment was conducted from noon (12:00 hours) to noon during a full moon phase. The results of the experiments indicate that when illuminated by artificial light sources, such as fire department light trucks or an exposure fire, PV systems are capable of producing electrical power sufficient to cause a lock-on hazard.

#### Severing of Conductors and Potential Damaged PV Modules

During firefighting operations where PV systems are involved, a firefighter may be subjected to an electrical shock hazard due to cutting of live electrical PV conductors or raceways. A series of experiments were conducted to demonstrate the potential electrical hazards from the severing of

conductors in PV systems using cable cutters, an axe, rotary and chain saws. A wire connector was attached to accessible metal hardware on each device to represent a firefighter coming in contact with the metallic portions of the tool. In addition, PV modules representing metal rack mounted, building integrated, and laminate on metal roof technologies were investigated.

The results of the experiments indicate a fire-fighter may be subjected to an electrical shock hazard due to damaged PV system components, as live electrical parts may become exposed. Some of this damage may occur during the fire or during overhaul operations. Additionally, damage to wiring and modules from tools may result in both electrical and fire hazards. The hazard may occur at the point of damage or at other locations depending on the electrical path. Metal roofs present unique challenges in that the surface is conductive unlike other types such as shingle, ballasted or single ply. Care must always be exercised during ventilation and overhaul.

## Presence of Water and PV Power during Suppression

Safe firefighting activities normally require that the building's electrical power be disconnected before water is applied to a building fire during suppression activities. The following experiments were conducted to investigate potential shock hazard from damaged energized equipment and from direct impact from hose streams.

Although some guidelines already exist for safe approach distances for firefighters with hose streams and live electrical equipment, guidelines based on voltage and current levels expected in PV installations had not previously been explored. Thus, experiments were conducted using different nozzles, water pressure, conductivity, voltages and distances. The electric shock hazard due to application of water is dependent on voltage, water conductivity, distance and spray pattern.

The research found that slight adjustments in water stream during firefighting and distance impacted the risk of shock. In addition, pooled water or foam may become energized due to damage in the PV system. A full summary of the distances and spray patterns which measured in the Safe and Perception categories for various PV system voltages is provided in the full report.

During structural firefighting operations electrical enclosures may be directly struck, intentionally or unintentionally, by a hose stream. To evaluate the potential shock hazard, electrical outdoor enclosures were subjected to hose stream tests. Outdoor weather exposure rated electrical enclosures are not resistant to water penetration by fire hose streams, as a typical enclosure will collect water and present an electrical hazard.

## Effect of Direct Contact with Energised Components

During a fire event, a PV array including modules, components, and their associated wiring may be subjected to thermal and mechanical stresses that can result in damaged energized devices and wiring. Direct contact with these exposed energized PV system components could lead to a firefighter exposure to an electrical shock hazard.

To address this concern, a series of experiments were conducted on functioning PV arrays. Two sets of experiments were conducted. The first set represented a room of fire within a building that transitioned to a structure fire beneath the array. The second set of experiments represented two fire conditions: a room of fire venting out an open window and a debris fire under an array. The room utilized wood pallets as a fuel source, while the debris fire used pine needle straw.

Two additional experiments were conducted using the same fire test fixture and metal-frame modules to explore: a confined fire directed from inside the bunker to the roof through a window, and fire originating on the roof from material and





debris located under the modules. These additional experiments were designed to terminate the fire before the roof collapsed, thus providing a means to investigate tactical challenges for the fire service in performing overhaul operations with a partially damaged, but potentially electrically hazardous roof array.

Results from the experiments described above indicate that severely damaged PV arrays are capable of producing hazardous conditions ranging from perception to electrocution. Damage to the array may result in the creation of new and unexpected circuit paths. These paths may include both array components (module frame, mounting racks, conduits etc.) and building components (metal roofs, flashings and gutters). Responding personnel must stay away from the roofline in the event of modules or sections of an array sliding off the roof. Fires under an array, but above the roof may breach roofing materials and decking, allowing fire to propagate into the attic space. Hence, caution must be exercised during all operations. both interior and exterior. One should contact a local professional PV installation company to mitigate potential hazards.

## Emergency Disconnect and Disruption Techniques

Lastly, a main test array consisted of 26 PV-framed modules serving as a test bed with a 5980 Watt total rated power. With all 26 framed modules wired in series, the maximum open-circuit voltage was 964V, and at maximum power the voltage would be 792V. The roof structure also included an open test bed area where additional modules and/or different PV technology devices were mounted and wired to the main array for test purposes.

During firefighting operations, the best a firefighter can often do to de-energise parts of a PV system would be to open all PV disconnecting means, realizing that the conductors and components between the PV modules and the disconnect will remain energized. Currently, the only effective way to depower is to block illumination of the PV module to provide a safe work environment. Turning off an array is not as simple as opening a disconnect switch. Depending on the individual system, there may be multiple circuits wired together to a common point such as a combiner box. All circuits supplying power to this point must be interrupted to partially to de-energize the system. As long as the array is illuminated, parts of the system will remain energised.

Tarps or foam may be used to cover the modules in the array to block light. Tarps offer varying degrees of effectiveness to interrupt the generation of power from a PV array. The research did find that heavy, densely woven fabric and dark plastic films reduce the power from PV to near zero. Caution should be exercised during the deployment of tarps on damaged equipment as a wet tarp may become energized and conduct hazardous current if it contacts live equipment. The use of tarps that completely block light prevented the best option as the research discovered that firefighting foam should not be relied upon to block light.

#### Summary

The results of these experiments provide a technical basis for the fire service and PV installation industries to examine their equipment, tactics, standard operating procedures and training content. The two groups have made progress in working together to begin to address firefighter safety issues and this research provides further intelligence and findings for consideration as these discussions and partnerships continue.

Details of the experiment procedures and results of this research project are available in a formal report and as an online training program. Both are available on the Underwriters Laboratories (UL) website.

Robert Backstrom is a Research Engineer with UL's Corporate Research Department

For more information, go to www.ul.com/fireservice



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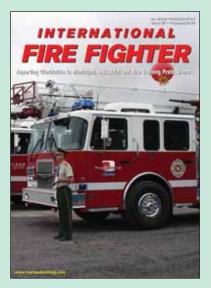
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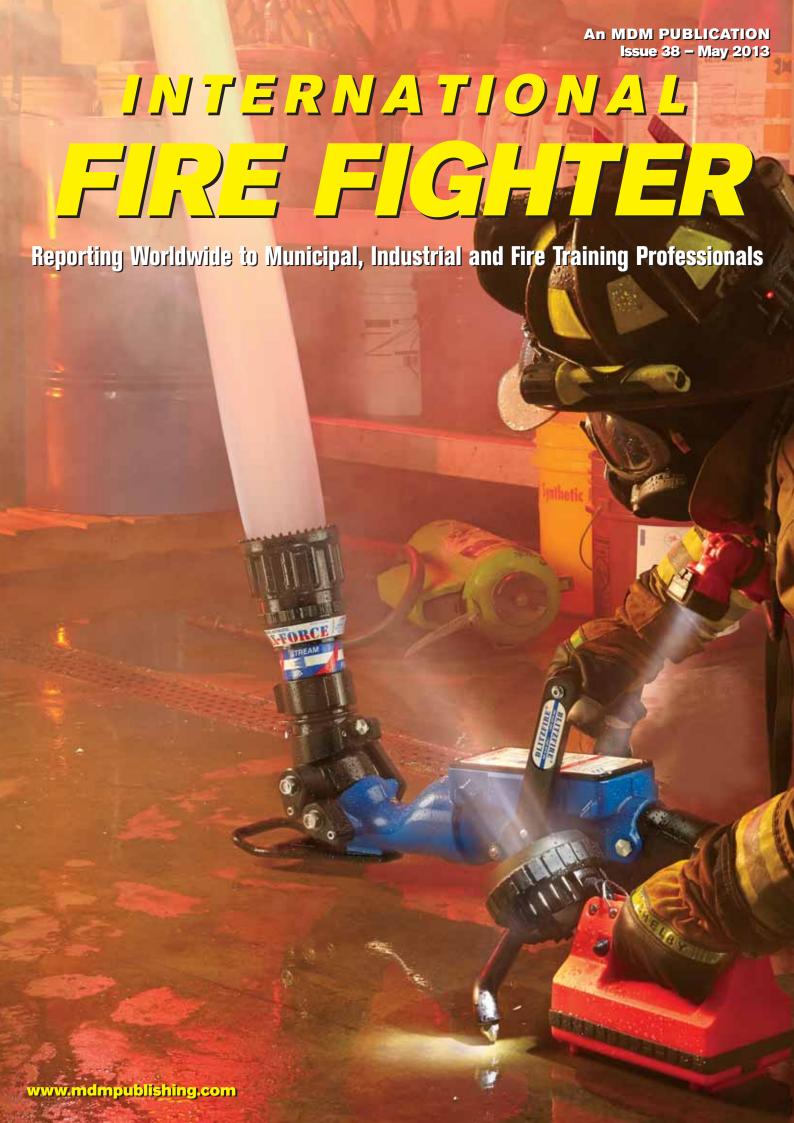
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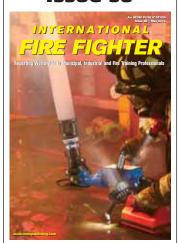
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The Blitzfire HE (High Elevation) Monitor is manually adjustable from 10°-86° above horizontal. Picture courtesy of TFT

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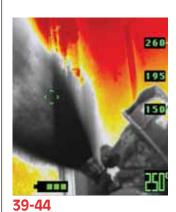
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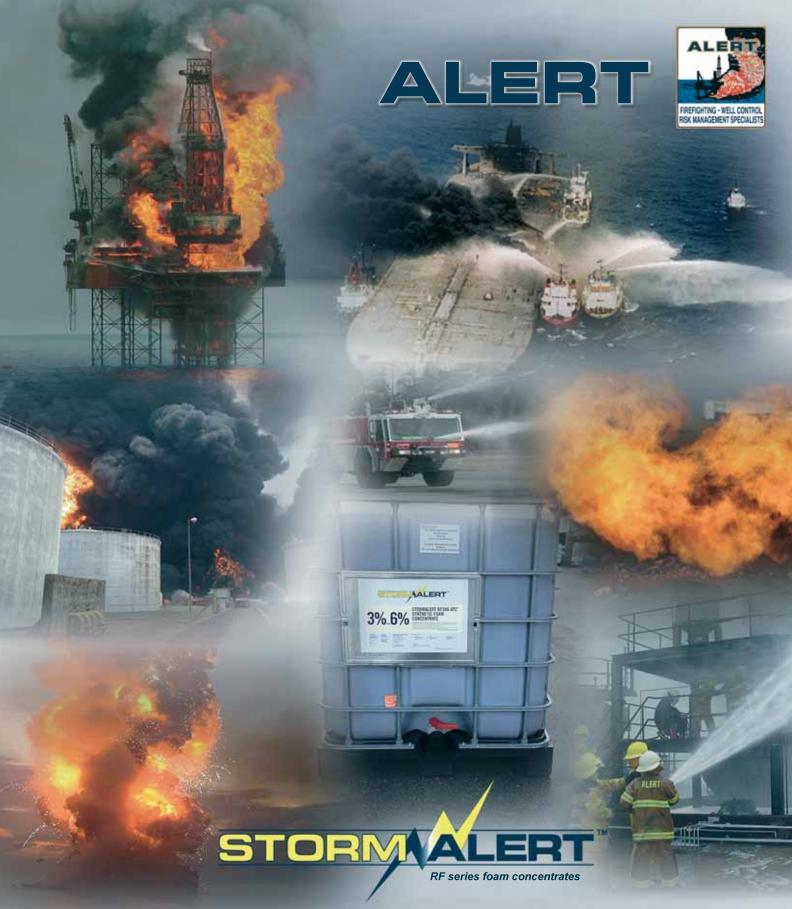


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**Graham Collins** Email: graham.collins@ mdmpublishing.com

#### All in a Day's Work

Once again, tragic events around the world have demonstrated the variety and complexity of the many challenges faced by emergency services' personnel. It is to their everlasting credit that the men and women we turn to when disaster strikes – be they professionals or volunteers – show that they are more than up to the task and willing to risk life and limb in the service of others.

n the past few months, fire and rescue personnel around the world have again had to contend with record-breaking cyclones and hurricanes in densely populated areas, together with floods, landslides and earthquakes in some of the world's most inhospitable an inaccessible regions. There have also been numerous headline-making conflagrations in Russia, Argentina and India to name but a very few. Now, they once again also have the spectre of homeland terrorism to contend with, following the terrorist bombing outrage at the recent Boston Marathon in the injury in nearly half of the cases was stress or overexertion. Vehicle collisions accounted for just under a quarter of the fatalities, which was more than a four-fold increase in firefighter deaths during 2012. Heart attack or stroke accounted for 41 percent of fatalities, followed by trauma at just over 32 percent.

These figures for the USA suggest that the likelihood is that, globally, the firefighter annual death toll must be in the high hundreds, if not

Cynics are sometimes quick to point out that firefighting is not the most dangerous "civilian"

Firefighting is an occupation where the individual consciously opts to put his or her life on the line as part of the job, one where the individual's family has the daily worry that their loved one may not return.

The ultimate price firefighters pay is hard to define on a global basis as reliable statistics are simply not available for the less advanced countries, many of which have poor fire safety records that pose additional risks for firefighters.

However, as an example, in the USA alone, so far this year 19 firefighters have lost their lives, according to figures from the US Fire Administration (USFA). The even more saddening concern behind this statistics is that, by the time this edition of *International Fire Fighter* goes to press and you read this editorial, the list will, in all probability, have grown. Last year, 83 firefighters in the USA died in the line of duty, nearly half of which were volunteers. This figure is still being quoted as "provisional" but, as it stands today, it is the same number of firefighter losses as in 2011.

In the USA, volunteer deaths accounted for 48 percent of the total figure, while career firefighter deaths stood at 39 percent. The cause of fatal

non-military occupation. That may well be true, but it glosses over one particularly pertinent fact of the "top most dangerous jobs"; firefighting is an occupation where the individual consciously opts to put his or her life on the line as part of the job, one where the individual's family has the daily worry that their loved one may not return.

All of which, hopefully adds a human dimension to the shiny new pieces of equipment that are displayed at the major firefighting and rescue exhibitions and conferences around the world. The NFPA Conference and Expo in Boston in June in Chicago will be no exception. On show will undoubtedly be the best of the best firefighting, search and rescue, fire protection and disaster recovery equipment, firefighting agents and vehicles. But it is worth remembering that all of that counts for little if men and women are not prepared to put themselves at risk by using the equipment for the benefit of us all.







www.mdmpublishing.com

#### **New CBRN Spectrometer**

ARGON ELECTRONICS has launched the RIIDEye-SIM-NaI-P, a spectrometer simulation probe that enables responders to train how to use the Thermo RIIDEye handheld radiation isotope identifier without an ionizing radiation source. The probe is the latest innovation from the company that enhance both the quality and safety of CBRN training and is based upon Argon's use of ultrasound and RFID (radio frequency identification devices) to simulate hazardous material.

With the RIIDEye-SIM-NaI-P installed, CBRN trainers can plan exercises in which the RIIDEye responds to Argon's GS3 gamma radiation simulation source, which can be set to represent specific nuclear isotopes such as Cs137 and Co60. The simulator probe is also PlumeSIM compatible, permitting radionuclide identification exercises to take place in either virtual table-top or large area field exercises involving scenarios such as radiological dispersion devices or a nuclear power station accident. All RIIDEye audio and visual alarm functions are maintained throughout the simulation exercise, as well



as the data down-load capability

The new spectrometer has also been designed to provide long, uninterrupted service during training. The probe is powered by a separate integral rechargeable battery and requires no preventative maintenance or

recalibration. Argon has also launched the SAM940-SIM-NaI-P, which caters for users of a previous version of RIIDEye, called the SAM940.

For more information, go to www.argonelectronics.com

#### Risk Profile Mapping

Amsterdam-Amstelland fire brigade in the Netherlands has deployed QLIKTECH's QlikView to map risks in the region and proactively respond to those risks. It forms the basis of a risk profile that combines 600,000 objects in Amsterdam – buildings, railways and roads – and possible incident types such as house fires, traffic accidents and carbon monoxide poisoning. QlikView displays this information in conjunction with the recording of actual incidents and data from a Key addresses and buildings register. This delivers 12 million possible incidents that the fire brigade can anticipate with precision.

The fire brigade uses the digital risk profile to calculate the risks as accurately as possible; the probability of an incident is multiplied with its effect. In this way the risks are mapped. However users can also zoom in on the fire incident types to see which incident is most common in which location. Because of this risk profile, the fire brigade's management also has improved steering capabilities. They can provide an accurate training plan, focusing on the risks in the area where a firefighter is employed. Moreover they can better inform the fire districts, municipal districts and neighbourhoods about specific risks. All information is available real-time and the system is designed so that other brigades can also work with the data.

For more information, go to www.qlikview.com

Explosive Environment Suite

ANSELL has unveiled the Trellchem Super gas-tight chemical protective suit that has been tested to and fulfills the requirements of the ATEX Directive 94/9/EC for equipment to be used in potentially explosive atmospheres.

Trellchem Super has been on the market nearly 30 years and is certified to the highest standards in Europe and is used in various industrial applications. Now, the Trellchem Super garment material has been upgraded by adding conductive carbon black in one of the rubber layers, thereby achieving new antistatic properties. It is approved for use in Zone 0, 1, 2 (gas)/20, 21, 22 (dust) and Group IIA, IIB, IIC, that is within environments with the highest explosive risk.

The protective suit is available in both fully encapsulating and non-encapsulating design and can be fitted with boots or socks, a variety of gloves, airline pass-through, pockets and loops to fit each customer's specific needs. It holds certificates to EN 943-2/ET, EN 943-1, EN 1073-2 (Protection against radioactive particles) and EN 14126 (Protection against Infective agents).

For more information, go to www.ansell.com



Turbo-Powered Rescue

LUKAS is promoting its P 650 4Power units as offering top performance for both rescuers and rescue equipment at every situation where speed and power are called for.

The company offers four types of P650 4Power power units with gasoline and electric motors Thanks to their four connectors, they can supply up to four tools with full power at the same time. When conditions require fast work at maximum power, the switch to turbo mode is quick and easy, causing the power unit to combine two oil flows and direct them to a rescue tool with high oil volume. When a complete rescue set with

cutter, spreader and rescue ram needs to be operated, the 4Power unit supplies two

tools in normal mode and a third – such as the rescue ram, with high oil requirement in turbo mode.

For more information, go to www.lukas.de

#### Zero Maintenance Gas Monitor



SCOTT SAFETY has announced the introduction of the Protégé ZM single gas monitor – a zero- maintenance, single-gas monitor that is claimed to be easy to use and delivers:

"... high performance in a small, ergonomically designed package."

It is a zero maintenance solution, meaning no battery charging and no sensor calibration is necessary to operate the monitor. The monitor has a high performance battery that provides two years of operation. In typical conditions, calibration will not be necessary during the operational lifetime. Three single gas models are available including oxygen, carbon monoxide and hydrogen sulphide.

The new monitor is small, lightweight, ergonomically designed and meets IP67 requirements for ingress protection. It is simple to use. Just turn it on for the first time, and it does the rest. Using the default settings from the

factory there is no need to set up or program the monitor.

It features plenty of customisable settings to meet specific needs. For example, a hibernate mode is available on the CO and  $\rm H_2S$  models, which puts the monitor in a deep sleep for up to one year to extend the operating life beyond two years. Users can customise the alarm set points or order monitors with custom alarm set points programmed in the factory. They can also set up custom bump and calibration reminders. The monitor has the option to display continuous gas readings, life remaining or both. The monitor has a three point alarm – audible, visual, and tactile – and data logging capabilities.

The Protégé ZM is supported by a portfolio of accessories including a four-bay test station and IR connect programmer. The test station supports bumping, calibrating, hibernating and programming of up to four monitors simultaneously, and is available in both portable and table-top versions. The IR connect allows programming and hibernating of individual monitors.

For more information, go to www.scottsafety.com



#### **Middle East Striker**

OSHKOSH AIRPORT PRODUCTS GROUP has delivered nine Oshkosh Striker 6 x 6 aircraft rescue and firefighting vehicles to Abu Dhabi Airports Company, which owns and operates Abu Dhabi International Airport in the United Arab Emirates. All feature a 6 x 6 axle configuration and one is outfitted with a 19.8-metre Oshkosh Snozzle high-reach extendable turret (HRET) for faster and more effective fire response.

The Snozzle HRET is able to operate as an elevated water tower through a doorway or over a wing exit without



endangering firefighters. The product's ability to shoot a full master stream at ground level allows for quick and effective cooling of burning aircraft tires and hot brakes. Available in either 15.2-metre or 19.8-metre boom lengths – and single or dual nozzle configurations – the Snozzle offers a tip-mounted, forward looking infrared (FLIR) camera that allows the operator to quickly locate and pinpoint the heat source.

For more information, go to www.oshkoshairport.com



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The conference will explore the following major themes:

- The need for transformational change
- How emergency management is responding to future challenges
- Creating public value
- Large scale disasters

   what should be done differently?
- Risk management: taking a risk based approach for the future

Early bird registrations close 28 June 2013

Full conference program and to register www.afac2013.org

### The Cobra Strikes!



The new Cobra EXM from ELKHART BRASS is being heralded as delivering: "...big water in a small package. Smaller, lighter and more affordable than anything in its category...".

Taking advantage of Elkhart's EXM operating system, the Cobra delivers up to 5678 litres-aminute with what the company claims is less friction loss than competitive monitors; it has symmetrical design for efficient and smooth operation and comes as a compact package that works in the tightest spaces. Rugged components, such as thrust rods and bearings, deliver ten-times greater durability, plus the Cobra offers fully programmable travel speeds, stow and oscillation. It has easy-to-use, two-way fibre-optic controls that allow wired or wireless operation and simple plug-and-play electronic components.

For more information, go to www.cobraexm.com

8

#### **Misting Rehab Tool**

A easy to use and low cost rehabilitation tool designed to prevent heat related injuries and fatalities in firefighters is being promoted by HEATSEEKER TECHNOLOGY & DESIGN.

The award-winning Heatseaker incorporates six misting nozzles and is designed to attach to an existing standard 63.5mm apparatus pump discharge to deliver a cooling mist. It replaces the cap that is used to keep debris out of the pumps, so no set up is needed and Heatseeker is ready for immediate action. It utilises a minimal amount of water, and has the ability



to cool an area up to an angle of 30°. When not discharging a water mist, the Heatseaker cap continues to keep debris out of the pump.

Heatseeker was designed and built by firefighters in the USA. This simple technology compares with the complexity, cost and lengthy set-up time of conventional misting fans that, additionally, take up valuable space on the firetruck, need power and a separate water supply.

For more information, go to www.firegroundrehab.com

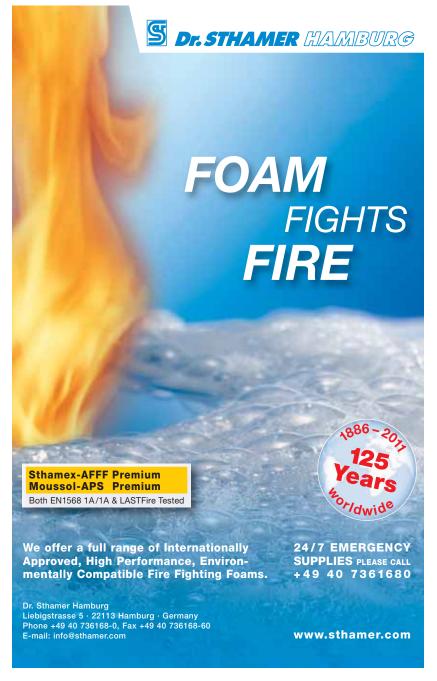
## New Mini Simo with BOOST! from AMKUS



AMKUS Rescue Systems (Downers Grove, IL) is proud to introduce their latest innovation in high performance extrication tools and equipment, the GH2B-MCH Mini Power Unit.

The GH2B-MCH offers two tool simultaneous operation with "BOOST" mode. When in alternate operation, "BOOST" mode will increase tool speed in both pump stages. Weighing in at approximately 58 lbs., the compact unit offers a carrying handle and is very portable. In addition, the modular design reduces the time required for service.

For more information or to schedule a demonstration, please contact AMKUS at 1-800-592-6587 or visit www.amkus.com



## **Emergency Management Conference in Melbourne**

More than 1400 delegates will come together in Melbourne between the 2nd and 5th September to discuss the latest challenges and trends in emergency management at the biggest and most important all-hazards conference of its kind in Australasia – the 20th AFAC and 10th BUSHFIRE CRC conference.

Keynote speakers at the conference include Australia's Chief Climate Commissioner, Professor Tim Flannery and David Kaufman of the US Federal Emergency Management Agency. With national and international speakers presenting at over 90 sessions over four days, the conference is an opportunity for delegates to hear from speakers from different industries to contribute to the emergency management sector's understanding of how to work together collaboratively to form partnerships.

The conference will also be the biggest



emergency management trade exhibition held in the southern hemisphere, with many businesses showcasing their products that help protect communities.

Launching the conference program, Victorian Country Fire Authority Chief Officer and Chair of the Conference Steering Committee, Euan Ferguson, said the conference theme *Shaping Tomorrow Together* recognises the need for emergency services to work together collaboratively with the community and other partners from the education, health, business and research sectors, and all levels of government, to shape the future.

Bushfire Cooperative Research Centre CEO, Gary Morgan, believes the conference and Research Forum will show why research and innovation are more important now than ever. He says: "Emphasising the diversity of the

research being conducted across all hazards, the science on show at the event will highlight the significant work that Bushfire CRC is delivering to emergency service agencies."

For more information, go to www.afac2013.org

## New Vapour Suppression Spheres



Material engineering company, TRELLEBORG, has developed an advanced composite material specifically designed as a fire and vapour suppression agent for large storage tanks containing hydrocarbon polar or non-polar

Applied as a semi-permanent vapor barrier, or used as an additive to fire-fighting foam, the new Vapor

Suppressing Spheres create a barrier between both polar and non-polar flammable liquids and the vapour space above. As the product is capable of handling high temperatures and has an oil repellant outer coating, the barrier lasts indefinitely compared with the temporary barrier that traditional 'wet' foam provides, therefore eliminating the need for continuous re-application.

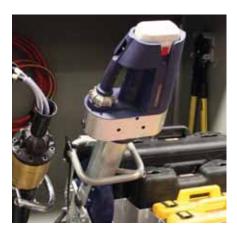
The individual spheres, which vary in size from 3mm to 5 mm, are applied dry and self-assemble into a foam-like structure that is lighter than both oil and water. The resulting 'foam' suppresses vapours to the point of extinguishing the liquid hydrocarbon fires. Unlike traditional water-based foams, the dry foam fire suppression spheres work without freezing or bubble degradation, and do not contain fluorosurfactants. Since the spheres do not rely on water to put out fires, they are most suitable for applications where water is scarce and in regions of the world where low temperatures pose freezing issues.

Another application for the Vapor Suppression Spheres is in chemical storage tanks that, due to safety reasons, cannot have a physical roof. The company recently completed an extensive in-house and third-party testing program to quantify the ability of the spheres to function as a semi-permanent floating roof; an alternative to the traditional foam solution. The conclusions indicated that a 150mm layer of spheres could provide a suppression evaporation rate of hydrocarbon up to 98 percent of that in a tank with no spheres.

The spherical shape and specific gravity of the spheres allow them to spread easily and in layers, providing improved blockage of vapor paths.

For more information, go to www.trelleborg.com

#### New Cutter Mount



ZIAMATIC CORP. (Zico) has added to its Quic-Mount line of extrication tool mounting solutions with the QM-ET-MVE.

QM-ET-MVE is designed to safely and securely support the full weight of a battery-powered cutter tool upright in the compartment and boasts more than ten independently adjustable components. These include tilt angle, for a most secure fit. The raised cradle arm grips the tool handle and supports the weight of the tool's battery end. Mounting to virtually any flat surface, the heavy-duty aluminum QM-ET-MVE eliminates the need for expensive custom-fabricated mounting boxes.

For more information, go to www.ziamatic.com

#### **Spider to the Rescue**

The HOLMATRO Spider range is being promoted as the latest innovation in hydraulic pump performance. By enabling faster tool operation in the most commonly used working pressure range, revolutionary three-stage pump technology makes the rescue operations much faster.

Four models are available with a variety of features and options to meet rescue workers' personal requirements. The SR 10 super-compact petrol pump is the smallest in the range and offers single tool operation, while the SR 20 compact pump is available with a petrol or electric engine for single or multiple tool operation. Both the SR 10 and the SR 20 are lightweight and ergonomically designed for ease of carrying. The SR 30 compact rescue module comes complete with hose reels and tool support, and the heavy-duty SR 40 is said to be lighter than comparable pumps on the market.

All models in the Spider range incorporate three-stage pump technology. This delivers higher flow in the second stage enabling rescuers to cut through the B-pillar of an older model car in half the time it takes a two-stage pump. The third stage delivers lower flow yet higher pressure, allowing the rescuer to cut through hard, reinforced pillars in a



controlled way. The result is faster tool operation and more control when you need it.

Other standard features include Core single hose technology and a large hydraulic oil capacity for use with any tool, including all heavy-duty rescue equipment. SR 20, 30 and 40 models

even offer simultaneous tool operation. Optional extras include LED lighting and a quick-fix-and-release bracket with universal mounting to secure the pump in the truck.

For more information, go to www.holmatro.com

#### New F & R Helmet



DRAEGER SAFETY UK has launched its new HPS 7000 helmet for the fire and rescue industry that offers protection all around a firefighter's head and face against a variety of impacts including sharp objects, flames and extreme heat.

For more information, go to www.draeger.com

#### Multi-Purpose Boot

ROSENBAUER has launched its new Twister-cross, a short boot with a Class C shaft that is suitable for all firefighting and rescue operations and has EN 15090:2012 F2A HI3 CI AN SRA certification instead of the 280mm shaft length stipulated in Austria by ÖBFV-RL KS – 06.

It offers enhanced wearer comfort due to special cushioning and two flex zones made from soft, grained leather. In spite of a height of only 190mm, the Twister-cross complies with the highest class of fire service operational safety and, as one of the few available short boots, is also suitable for indoor attacks. Ankle protection, steel inserts and toecaps protect the foot against injury. In addition, reflective elements ensure maximum visibility even when over-trousers are worn.

The Twister-cross is optionally available with a membrane. The Sympatex membrane and hydrophobic leather mean that the TWISTER-cross is largely waterproof and offers optimum protection against viruses, bacteria and liquids. The multilayer sole with air cushioning between

the layers provides excellent insulation against cold and heat. The boot has a very low weight of approximately 2.2 kilogrammes.

The boot is also fitted with the innovative BOA lacing system. This utilises break-resistant, coated, stainless steel laces and a push/turn knob that enables the boot to be pulled on or off in a flash, as well as providing a perfect fit.

For more information, go to www.rosenbauer.com







# Latest ARFF Apparatus Designs Stress Safety, Quick Attack

Makers of aircraft rescue and firefighting (ARFF) apparatus are continually improving their equipment, upgrading their units' ease of use, adding safety features and turrets, increasing fire suppression capabilities, and making more nimble vehicles.

Alan M. Petrillo

#### **ARFF Primer**

he Federal Aviation Administration (FAA) developed ARFF vehicle requirements (Class 1 through 5) using National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles, as its baseline, as well as an airport index the FAA uses to rate airports by the length of aircraft using the airport (Index A through E).

Index A includes aircraft less than 90 feet long; Index B, 90 feet but less than 126 feet; Index C, 126 feet but less than 159 feet; Index D, 159 feet but less than 200 feet; and Index E, aircraft at least 200 feet in length.

A Class 1 four-wheel drive diesel ARFF vehicle must carry 100 gallons of water/aqueous film forming foam (AFFF) and 500 pounds of sodium-based or 450 pounds of potassium-based dry chemical, or 460 pounds of halogenated agent. Class 2 ARFF units must carry 300 gallons of water/AFFF and the same dry chem complement required as Class 1. Class 3 ARFF vehicles must

carry 500 gallons of water/AFFF and class 1 dry chem requirements.

A Class 4 ARFF vehicle covers a commercially produced diesel-engine-driven unit for an Index B, C, or D airport with a 1,500-gallon water/AFFF fire suppression system and, depending on the airport, a complementary 450- or 500-pound dry chemical and a 460-pound halogenated agent system.

A Class 5 ARFF unit includes a 3,000- to 4,500-gallon water/AFFF fire suppression system and complementary 450- or 500-pound dry chemical and a 460-pound halogenated agent system. Class 5 ARFF vehicles cover Index D and E airports.

#### **Running the Gamut**

Marty Huffman, ARFF regional manager for Rosenbauer, says his company covers the entire spectrum in the ARFF market from Class 1 to Class 5 vehicles. He notes that Rosenbauer's crash trucks are built on the custom Panther chassis with water tanks up to 3,000 gallons (built in the United States) and to 4,500 gallons (built at



Rosenbauer's parent location in Linz, Austria). "Generally the 1,500-gallon ARFF vehicles we build are 4x4 units and the 3,000-gallon ARFFs are 6x6," Huffman says. "For the Index E airports that use a 4,500-gallon ARFF truck, they are 8x8 units. Examples of those ARFF vehicles can be found at the Los Angeles, California, International Airport."

Rosenbauer also makes the Air Wolf line of Class 1, 2, and 3 ARFF vehicles, typically on Ford F-550 or International chassis and carrying up to 750 gallons of water.

Huffman says the two primary components on the ARFF units Rosenbauer builds are high-volume low-attack (HVLA) turrets and high-reach extendable turrets (HRET). "In the past five years, there has been a trend toward the HVLA turrets," Huffman points out. "Many fire departments are removing the roof turret and making the bumper turret the main firefighting turret on the vehicle."

Huffman says an HVLA turret can lower to within 12 inches of the ground, allowing the vehicle operator to attack low spots in an aircraft fire, such as under a wing or in the landing gear area.

For Index C, D, and E airports, Huffman says Rosenbauer has been building ARFF vehicles with HRET units, essentially a boom mounted on top of the vehicle that can extend and penetrate into an aircraft to deliver multiple agents-water, foam, dry chemical, or halogenated agent.

Rosenbauer makes the Stinger, a hydraulic system that builds up to 32,000 pounds of pressure to force a penetrator into the side of the aircraft to deliver fire suppression agents. The system allows the ARFF operator to rotate the penetrator 180 degrees to make positive penetration of the aircraft and not skip off its curved sides.

"Hydrochem technology is now a standard in ARFF vehicles," Huffman points out. "Usually there's a high-flow nozzle with a tube in the center of it that allows dry chemical to be discharged simultaneously into the foam-water stream. You get the knockdown of dry chem plus the cooling and sealing effect of water and foam behind it."

Huffman notes some fire departments have been requesting compressed-air foam system (CAFS) units on both 1,500- and 3,000-gallon ARFF vehicle variations. Huffman says that Ottawa International Airport, in Canada, has two Rosenbauer CAFS ARFF vehicles that can flow CAFS out of their roof turrets, while an ARFF unit

at the Burbank Airport, in California, uses a compressed-air stored-energy system on board to produce what he calls "Flash CAFS."

#### **Global ARFF**

One of the best-known names in ARFF vehicles is the Oshkosh-produced Striker, whose first generation appeared in 2001. Today, Oshkosh builds what it calls the Global Striker, a unit that is compliant to Euro 5 emission levels (a worldwide standard) and also to Environmental Protection Agency (EPA) 2014 emission standards.

Steve Schwartz, Oshkosh's product manager of ARFF equipment, says the Striker is guided from a performance standpoint not only by NFPA 414 but also by standards promulgated by the International Civil Aviation Organization (ICAO). "We took those standards and user input to make a walk-in engine compartment with a door on each side for easy access," Schwartz says. "All the filters are easily accessible with a drain pan underneath, and it's also easy to service bolt-on engine components and electrical components. Any major engine repairs can be made with the engine in the vehicle."

Schwartz points out that Oshkosh offers the new Striker with preconnected crosslays in trays that will hold up to 300 feet of 1¾-inch hose. "A firefighter pulls the hose, and when it is tugged out completely it activates the water-foam flow, which also can be activated from the cab or the hoselay panel," he says. "It improves responsiveness on a fire scene because firefighters don't have to unroll hoses and hook them up."

Schwartz says the Striker now has a pressuregoverned system, where the vehicle's engine ramps up to pump speed and maintains pressure as flows increase, whether using crosslay handlines, the turret, or the two unregulated 2½-inch discharges on the vehicle.

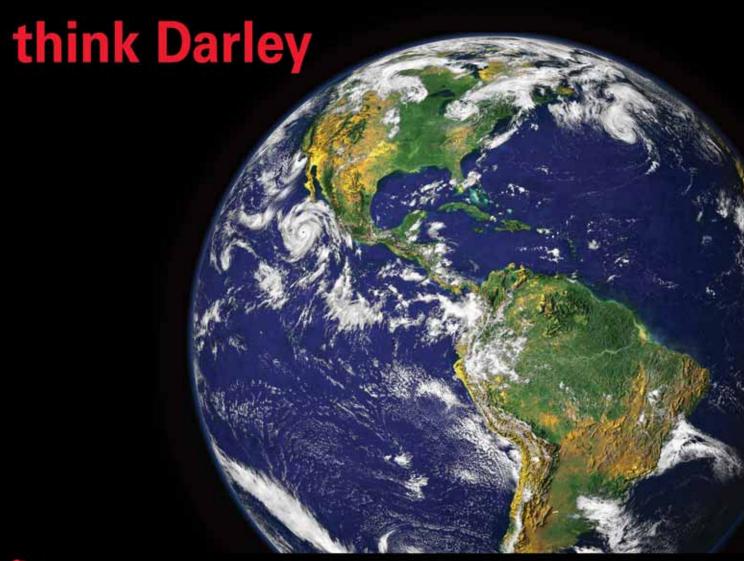
Oshkosh also took out some of the complications in the ARFF vehicle's cab, Schwartz adds. "We wanted to simplify things from an operational standpoint," he says. "We color-coded the buttons in the cab to activate the agent to be applied-blue for water, green for foam, and other colors for secondary agents like dry chemical or Halatron. The operator engages the rocker switch, which is denoted by universal symbols, and after that is ready to pull the trigger."

In the Striker cab, from the driver's center position, all the vehicle controls are on the left of the driver and all the firefighting systems are on



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#### **VEHICLES**

the right. The Striker is designed to be operated by a single firefighter. A typical Striker has an upper turret, a bumper turret, and an under turret depending on the customer's needs. "Either the roof or bumper turret can be the primary one with the larger flow nozzle," Schwartz says. "On a bumper turret, we offer a low-attack version where the nozzle can drop down and sweep the ground to fight a fire from a different angle. We also offer the Snozzle high-reach extendable turret for the top of the vehicle."

Oshkosh can install infrared cameras on the vehicle in various body locations or on the monitors and also has designed high-pressure firefighting capability into the Striker.

The Striker is available in a 4x4 chassis carrying 1,500 gallons of water and a 210-gallon foam tank with a 50-foot Snozzle, Schwartz says. The Striker 6x6 model typically has 3,000 gallons of

smaller airports or for special requirements," he adds. "More than 80 percent of the bids we receive are for Class 5 vehicles in 6x6 or larger."

While automotive performance capabilities have changed dramatically over the years in terms of emission requirements, acceleration, and roof strengths, the way ARFF vehicles pump water and deliver foam hasn't changed much, Krajnak points out. "They are designed to deliver a lot of water at a reasonable gpm and carry a certain complement of foam and dry chem, but it's not much different than 20 years ago," he says. "But, there are technologies being evaluated, especially by military entities, in the ultra-high-pressure (UHP) field. The United States Air Force has a UHP program with the goal to have as small a truck as possible. They are using far less agent and fighting fires with less foam and water, which could lead to a truck smaller in size."

Due to the casualty potential of an aviation fire, the speed in which emergency vehicles arrive at the scene is of paramount importance.

Their arrival and initial mission to secure the aircraft against all hazards, particularly fire, increases the survivability of the passengers and crew on board.

water, a 420-gallon foam tank, and either a 50- or a 65-foot Snozzle, while the 8x8 Striker is available with up to 4,500 gallons of water, 630 gallons of foam, and either a 50- or a 65-foot Snozzle. Both the 6x6 and 8x8 Strikers are available in rear-steer versions.

Oshkosh also makes the Stinger, usually built on a Ford F-550 chassis, that meets FAA Class 1 and 2 vehicle requirements. It can carry up to 300 gallons of water, a foam tank, up to 500 pounds of dry chemical powder, and 120 pounds of halogenated agent. "The Stinger fills the niche for smaller airports and is useful where municipal fire departments are responsible to protect an airport," Schwartz points out. "The vehicle has a structural firefighting capability, as well as a front-bumper turret and full pump-and-roll ability."

#### **Customized ARFF Units**

Dave Krajnak, airport product manager for KME, says that this year has been a busier year for building ARFF units than 2011. KME builds all five classes of ARFF vehicles and is able to customize them to the user's requirements. "One of our most successful configurations recently is an airtransportable design developed for the Canadian Department of National Defense," Krajnak says. "We delivered four units to them and three are stationed near the North Pole. The United States Navy recently awarded us a contract for a version of that vehicle because they needed a truck smaller than the standard ARFF vehicle."

The Canadian air transportable ARFF is a slimmed-down Class 4 vehicle, Krajnak says, "carrying just shy of 1,300 gallons of water and 130 gallons of foam." The vehicle being built for the United States Navy is a typical Class 4, he notes – a 4x4 carrying 1,500 gallons of water and 200 gallons of foam.

Krajnak notes that the predominant requirement of the ARFF market is for Class 5 vehicles of 6x6 or 8x8 configurations. "Class 4 vehicles end up in the

**Customer-Driven** 

R.J. Jones, E-ONE's sales manager for United States government and airport products, says his company has seen incremental improvements in the ARFF markets for three types of customers: United States airports, military firefighting units, and international firefighting units.

E-ONE offers the 4x4 Titan Force ARFF that carries 1,585 gallons of water, as well as a 6x6 version hauling 3,170 gallons of water. The Titan Force P-7 series typically is driven by a Cummins 665-hp QSX-15 diesel engine and an Allison EVS 4800 transmission and carries a Hale RSD 1,500-gpm pump on a 4x4 unit and a Hale RME 2,400-gpm pump on the 6x6. Foam tanks are 205 gallons on the 4x4 and 405 gallons on the 6x6, and both carry dry chemical and a halogenated agent.

"We've been moving away from building 8x8 vehicles even though we've built them in the past," Jones says. "Today, the majority of our business is customer-driven in the 4x4 and 6x6 ARFF vehicles."

Jones says features of E-ONE ARFF vehicles include the Rhino low-attack turret (which E-ONE purchased from Crash Rescue), a nitrogen bottle lift integrated into the vehicles' bodies for changing propellant bottles, spacious compartmentation, external pump panels and plumbing connections for ease of use with mutual-aid companies, and updated cab layouts with attention to ergonomics.

Grady North, E-ONE's product manager for pumpers, industrial and ARFF, says the company has been installing more side- and rear-mounted electronic components on its ARFF vehicles, as well as seat belt indicator systems, tire-pressure-monitoring systems, and forward incident recording camera systems. "We're also improving the multiplexing systems on the vehicles," he notes, "to allow adding these features without having to change the wiring harnesses."

This article originally appeared in Fire Apparatus & Emergency Equipment

Alan M. Petrillo is a Tucson, Arizona-based freelance writer and is a member of the Fire Apparatus & Emergency Equipment editorial advisory board. He served 22 years with the Verdoy (NY) Fire Department, including in the position of chief.















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#### TRAINING SIMULATORS



#### Understanding Live Fire Training Systems

Despite continuous efforts to provide a general understanding of what live fire training systems are and the benefits they offer, many organisations are still unsure of what factors to consider when procuring a live fire training system.

**Ruben Keuchen** 

**Kidde Fire Trainers** 

few years ago, fire training meant lighting a collection of leftover wood with unstable fire accelerants that firefighters then had to extinguish. This method was not safe, convenient or environmentally responsible. Modern live fire training systems – or as they are more often called "fire trainers", offer safe, reliable and environmentally sound training for firefighters. As demand for these systems increased, a variety of systems and manufacturers came into the market, typically differentiate by four categories.

#### **Fixed Structural Training Systems**

Structural trainers are systems that can be housed in a variety of structures in order to more realistically simulate a specific scenario for firefighters, ranging from single or multi-storey burn houses to tunnels, ships, aircraft and military rig structures. These training systems typically comprise several fireplaces within the structure with several rig specific mock-ups - for example, kitchen or bed fires in a burn house, galley and seat fires in an aircraft – to simulate certain scenarios typical in that particular structure. The structural trainer is also typically equipped with physical obstacles, smoke machines and sound generators to further replicate the conditions common to a fire event occurring in that particular kind of structure. For example, structural aircraft trainers typically experience fire instances related to fuel spills or issues with the engine or undercarriage.

The fireplaces in fixed structural training systems are fuelled by propane or natural gas, as they are cost-effective and environmentally responsible burning gases. Kerosene-driven systems are also available for ARFF personal but they have a bigger impact on the environment.

#### **Modular Training Systems**

Modular training systems offer similar functionality as structural trainers and are commonly considered to be more economical compared with the permanent burn structures, but have a shorter lifetime due to the nature of their container-based construction. Modular training systems are extremely versatile due to their ability to combine different types of containers and multiple fireplaces. They can also be easily expanded with additional containers and a flexible control system, and are environmentally-sound fuelled by propane or natural gas.

#### **Mobile Training Systems**

Mobile trainers are flexible and designed to bring training to customer locations or multiple training grounds. While these systems are typically self-sustained and equipped with electrical generators and gas tanks, they can also be customised with variants available on-site.

#### TRAINING SIMULATORS



The mobile systems can replicate typical house fires or aircraft fires. In the case of aircraft fires, the entire system can take the shape of an actual, small aircraft. Even industrial fires can be simulated. For example, typical HazMat tanker fires equipped with a training system looking like a generous tanker and replicate fires scenarios often associated with tankers.

However the flexibility of mobile trainers comes at the cost of a limited training capacity as the area for training is very small limiting the number of fire scenarios. In addition, these systems normally can only be fuelled by propane due to security reasons in transport; the use of natural gas is only possible if the system relies on on-site gas supply.

#### **Outdoor-Industrial Training Systems**

The widest category of training systems is outdoorindustrial training, which replicates fires on raised or multilevel industrial platforms, tank and fuel spill fires, as well as HazMat and vehicle training fires. Trainers of this category offer a variety of mock-ups and fire scenarios and can be combined with additional scenario-specific non-fire effects, such as leaking/decompressing gasses from cylinder valves or manifold failures, plating acid dip tanks and many more

HazMat training facilities are currently in demand due to the number of HazMat incidents and the many casualties suffered by first responders and firefighters over the past few years. In addition to these four main training system categories, a class of small portable trainers can be used for fire extinguisher training; however, they are not meant for firefighters.

#### Finding the Right Fire Training System for Your Needs

The sheer volume of fire training systems available on the market can make it difficult for interested parties to get a good overview. In addition, the systems are typically non-standard products that are customised to fit specific customer demands. However, Kidde Fire Trainers' experience in the industry has helped identify six key points that organisations should take into consideration:

#### 1. Define the Training Needs and Resources

Create a list of training needs by profiling the main incidents that firefighters have to face. Also review whether the existing training complies with official training standards, such as ICAO, NFPA and so on.

Once you have identified the profiles, set-up scenarios that reflect these incidents and define

which equipment (fireplaces, sound and/or smoke generators) is needed to conduct this scenario. Then compare the defined needs with the available resources (budget, training ground and training staff). In most cases, budget is the resource limiting the success of training.

#### 2. Find the Right Gas to Fuel Your Fire Training System

Two kinds of fuels are typically used by fire trainers in the market. Propane is the most common choice as it has been the only fuel choice for such systems for many years. Propane gas also has the advantages of

being cheap, clean-burning, relatively safe to handle as well as easy to obtain, store and transport.

Natural gas-fuelled fire trainers were introduced a few years ago and, since their introduction, have become very popular. Natural Gas has many advantages in common with propane; it is cheap, clean-burning, easy to store as well as relatively safe to handle. Its main advantage in comparison to propane is that it is even easier to obtain, as it can be taken directly from the lines of a local gas supplier, negating the necessity of a local storage tank. Nevertheless natural gas also has the disadvantage that it cannot be transported economically, which disqualifies it for use in a self-sustained mobile training system.

#### 3. Choose a Suitable Burning Technology

Two main burner technologies are available on the market: water bath and dry burner technology. Water bath fires tend to have a more natural visual appearance as the flames seem to "swim" on the water. However, water bath fireplaces need a constant supply of water for training sessions. The water pan can either be refilled manually after each session or by an automatic water supply system. The water in a fire pan also can freeze during periods with sub-zero temperatures making the system unusable. Water bath fires have a larger impact on the environment as these systems create higher emissions of unburned hydrocarbon and carbon monoxide.

In contrast, dry burner technology does not have the same challenges as the water bath since no water pan is used and the visual appearance of the flames is still very good. These systems can be used in all kinds of environment regardless of ambient conditions. The environmental impact of these systems is lower as combustion air is directly injected into the fireplace resulting in a cleaner burning process. In addition, the constant supply of combustion air negates the necessity for constant ventilation in a burn room, which is necessary for water bath flames. The fact that constant ventilation is not necessary when using dry burner technology allows the heat and smoke to last longer in the burning room preserving the intense conditions for a more intense training experience.

#### 4. Choose Your Degree of Control

The control system is the real differentiator of these systems. Typically you can categorise a control system as a manual, semi-automatic or full-automatic control. However, control systems

#### TRAINING SIMULATORS

offered by different suppliers can vary widely.

Nearly all suppliers offer an automatic agent detection or automatic agent reaction feature. This feature generally provides for a realistic reaction of the fire to the application of agent. Almost all full-automatic systems offer an interlinked start of fire scenarios. These mechanisms allow for the creation of scenarios where a fire is automatically reignited if a fireplace is not cooled down long enough or where a fire "spreads" over to another fireplace if a trainee does not extinguish a fire within a given time.

What really distinguishes these control systems is the number of adjustable parameters. The Kidde Fire Trainers T-2000 system, for example, allows the user to control a broad variety of parameters to create a number of different training scenarios using the same trainer. The T-2000 model allows adjustment of flame height, width, expansion, and minimum cooling time for flame extinguishing in addition to providing completely pre-programed fire scenarios for each individual trainee taking into account such factors as the specific equipment being used by the trainee.

#### 5. Quality and Design of Fireplaces and Mock-ups

The quality of a fireplace is one of the most critical criteria for measuring the overall quality of training systems as it is a key factor in the initial and maintenance costs and return on investment. Two factors mainly influence the quality: the kind of material used and its thickness. Kidde Fire Trainers remains committed to using only stainless or

carbon steel of 3 mm thickness for plates and 5 mm for the framework. These quality construction standards allow Kidde Fire Trainers to guarantee that its systems will have a lifetime of at least ten years.

The design of a fireplace is another important factor in measuring the overall quality of training systems. Some manufacturers offer customers nice looking fireplace mock-up designs, but seem to disregard their primary function as trainers. For example, thermocouples need to be integrated in the fireplace to detect agent application to the fire. However if the sensor is placed in a way that it can too easily be seen by the trainees, they can just cool the sensor directly instead of treating the fire in the correct way. Therefore, the optimal design of the fireplace hides the thermocouples in the fireplace.

#### 6. Safety

The most important principle of live fire training systems is to provide a safe environment to training participants. Even though most of the systems available on the market are considered safe in general, unfortunately not all companies apply the same safety standards.

When evaluating different systems, make sure that all safety precautions recommended by the manufacturer of your live fire training system comply with local and international regulations. All fire trainers should be manufactured to comply with the very strict DIN 14097 part 2 norm, which regulates the handling of gas fuelled fire systems. Compliance with this standard provides peace of mind that training can be conducted without any serious risks to at the safety of the trainees.

Ruben Keuchen is Global Marketing Coordinator at Kidde Fire Trainers

For further information, go to www.firetrainer.com



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# Are We Adequately Protecting Our LNG Facilities?



Mike Willson
Angus Fire

facilities over the past decade to provide a cleaner fossil fuel than the more traditional diesel and oil used for power generation, heating and commercial transportation. A substantial amount of that infrastructural development and investment is still being undertaken, particularly in Australia, the broader Asia-Pacific region, Africa, Russia, India and some parts of the Americas.

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tions? Let us investigate the extensive research that helps provide some answers.

#### What is LNG?

Natural gas is 83 percent to 99 percent methane, which reduces its volume 620 times when refrigerated to its liquefied state. This makes it attractive for transporting across continents, where no pipelines exist. LNG is stored at around minus 164°C, is colourless, odourless and flammable in

#### LNG FIREFIGHTING

air over a broad range, between five percent and 14 percent concentration.

#### **How does LNG behave?**

LNG looks just like boiling water in a kettle when it escapes from its containment tanks or pipework, and is heavier than air when released, quickly absorbing heat from its surroundings and creating a white vapour cloud, a fog of condensing water vapour from the rapidly cooling air that mixes with the vapour. Controlled warming can reduce LNG vapour density so it becomes lighter than air and rises away from ignition sources, but flammable concentrations are generally detected outside the white cloud drifting downwind from the release point, where a liquid pool soon develops.

Some people assume with such a huge temperature differential that any escaping LNG will quickly flash off and not develop into a pool, but guite soon after initial rapid vaporisation has stripped all the heat from the ground and immediate surroundings, a liquid pool will form and grow if the spill continues. Meanwhile the condensing water vapour cloud mixed with the methane is spreading downwind, and beyond its edges forms a flammable mixture that ignition sources can dramatically ignite. Burning back through the vapour cloud to the liquid pool rapidly increases radiation levels from the clean burning fuel without smoke to absorb heat. The intensity is typically three-times greater than an equivalent sized gasoline pool fire. Structural steel downwind can

The majority of industrial, petrochemical oil and gas facilities throughout the Middle East and, for the most part, a sizable proportion of the world, utilise NFPA standards for asset and life safety. In some instances, compromises are met. This can be an adventure all in itself.

Firefighters need to stay well away from the white cloud, which is often very cold and masks the cryogenic liquid pool beneath. LNG liquid is cold enough to crack structural steel, freeze and shatter most rubbers, conventional concrete, even gloved fingers if exposed to the liquid pool, or dense cloud hovering immediately above it.

quickly weaken and intended escape routes may become inoperable from the intense radiated heat. Trenches and impounding basins are often designed into the facility to collect any LNG spill, but what is the best way to reduce the risk of vapour ignition, and minimise the radiant heat from the pool, should ignition occur?

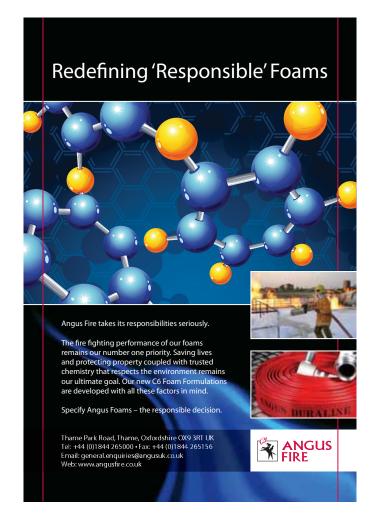
#### Why is LNG Vapour Dispersion Important?

While LNG carriers often use water spray systems to flush any spillage off the ship to avoid cracking the hull, then steaming away to leave the incident behind, this is not a practical option for land-based or tethered floating LNG production facilities. Water alone contains too much heat, increasing vaporisation rates and rapidly increasing the size of the vapour cloud drifting downwind.

Extensive research conducted at Texas A&M University's Engineering Extension Service worldclass LNG fire training facility with BP and Angus Fire, re-visited many options to determine the best vapour dispersion and fire protection answers for modern LNG facilities. Water, low-expansion foam and compressed air foam systems were quickly dismissed as they contain too much water, which boils the LNG too quickly increasing vaporisation rates without providing adequate vapour dispersion, or fire control. Yet high-expansion foam delivered through high performance LNG Turbex Skids and Expandol three percent high-expansion foam concentrate at an application rate of 10 Litres/square metre/minute (L/m²/min) delivered the necessary speed of response and control being sought.

High expansion foam contains sufficiently small amounts of water to quickly and dramatically reduce the rate of vaporisation when an un-ignited LNG spill occurs, and provides just enough warming to allow the vapours to rise steeply away from potential ignition sources near the ground, significantly reducing the risk of ignition.

Water sprays can be helpful providing a water curtain to prevent LNG vapours reaching sensitive areas, but they need to be ground mounted and produce an overlapping full 180° spray pattern



like the gunmetal Hydroshield unit, but care must be taken to ensure the resulting water does not drain into the LNG pool, as it could rapidly increase vaporisation rates, potentially escalating the incident.

#### Why Control Rather than Extinguish an LNG Fire?

Should ignition occur, vapour burns back to the liquid pool where radiant heat levels increase dramatically. Applying water or low-expansion foam adds too much heat simply intensifying radiation levels further. Dry chemical powder can extinguish small LNG pool fires, but unlike most flammable liquids, extinguishing LNG fires is not the preferred option, otherwise more un-ignited vapours spread out to find another ignition source, causing unexpected potential danger to personnel and facilities while recovering from the incident, and what do you do with the remaining LNG pool?

It is generally better to know where the fire is, and research showed that a controlled burn-off through a 500:1 high-expansion foam blanket dramatically reduced radiation levels from the LNG pool fire by 90 percent within 60 seconds of system activation. Regular top-up with foam maintained this radiation reduction until the LNG fuel burnt away.

Tests conducted with medium-expansion foam had varying success. Around 50-100:1 contained too much water and provided inadequate fire control, while expansions around 300-350:1 proved effective, but would add cost to any system compared to 500:1 in terms of extra generators, and larger quantities of foam concentrate and water demands for a given protection area, so it was only considered of significant value for protecting narrow trenches or very windy sites.

#### What Makes a Good System?

Uniform bubble size and stable foam blankets were found to be most effective when formed using forced air technology generators, where a water-driven turbine and fan assembly forced controlled amounts of air into the foam solution each minute to create a more stable and uniform foam bubble blanket, irrespective of wind conditions.

These LNG fixed Turbex skid units with wind protective hoods are specially designed to withstand the rigors of these extreme cold and hot applications. Special drainage slots take the initial foam solution away from the LNG pool and deliver it outside the pit, reducing unnecessary heat inputs before the high-expansion foam blanket is established. Special boiler-grade 316 stainless steel and gunmetal components need to be used that resist inter-granular corrosion and the adverse effects of saline coastal environments, while retaining strength even during prolonged flame exposure during operation. Glass rope insulation minimises the risk of the foam solution boiling in the turbine assembly. These units were proven time and again under severe fire conditions and worked reliably every time.

It quickly became clear that any standard high expansion fan driven generators for industrial applications, made from mild steel perhaps with some plastic, fabric netting or aluminium components, would be totally unsuitable for LNG applications. Similarly "spray on net" foam generating devices are easily starved of air by cross

winds. This dramatically reduces expansion ratios, causing more water to enter the pit and furiously boil the LNG. Consequently these "spray on net" devices are usually not up to the job either, yet they both exist beside LNG containment pits and should be replaced with some urgency, before they fail to adequately control an LNG incident.

Separate high temperature fire tests were conducted to verify that these standard industrial units quickly distorted, lost strength, components melted or locked up with heat expansion, and consequently failed to produce high-expansion foam, rendering them practically useless for LNG duty.

The choice of foam concentrate was also important as some high-expansion foam concentrates do not have sufficient stability to be suitable for the demanding conditions of LNG fires. High performance Expandol three percent high-expansion foam concentrate was found to be the most effective foam tested, even more so than the latest and considerably more expensive AR-AFFF concentrates.

However it is strongly recommended that any foam concentrate, or generator selected, should be proven and independently witnessed as effective on test LNG fires greater than 60m² area, before use in any modern LNG installation. Lower quality concentrates collapse too quickly and the draining water from the foam boils the LNG, intensifying the fire and breaking down the foam blanket faster so that a deep and stable foam layer cannot be achieved, even when higher application rates may be used.



#### LNG FIREFIGHTING

LNG ignition on 45m<sup>2</sup> pit with flames 30 metres high, which dramatically lose intensity, being reduced to about 1 metre high, when an effective Expandol foam blanket has been produced by the LNG Turbex foam generator skids



A number of passive systems were also investigated including intumescent coatings for steelwork to minimise distortion, but some of these gave off flammable vapours, which sustained ignition for prolonged periods.

The use of passive low-density cellular glass blocks was also subsequently tested. These float on the LNG surface and reduce the heat feedback to the pool thus significantly reducing fire intensity and heat radiation. They worked well on a 65m<sup>2</sup> LNG pool fire when newly installed. Concerns raised that residual moisture from humidity, dew or recent rainfall could cause them to be frozen to the impounding basin floor and sides during an LNG spill, potentially holding them beneath the LNG surface, were overcome by raising them up on supported steel mesh. Over time dust, debris and degradation of containment sacs may reduce their efficiency or buoyancy, so their long term reliability and effectiveness probably has still to be evaluated.

Without ignition, there was some vapour

reduction from these glass blocks, but they generated no warmth to encourage the LNG vapour to rise, making it significantly less effective than a well-designed high-expansion foam system, which achieves rapid vapour reduction and dispersion upwards, minimising risk of ignition. Foam also delivers rapid and effective fire control, should ignition subsequently occur at a higher level.

#### Are You Adequately Prepared for an LNG Spill?

Well-designed active foam systems should reliably reduce the impact of both an un-ignited LNG spill and vapour ignition. By reducing vaporisation rates and dispersing vapours upwards, the risk of ignition is minimised. Delivering a controlled LNG burn-off quickly reduces radiation intensity, should the vapours ignite. Regular top up with high expansion foam during this controlled burn-off period will maintain acceptably low radiation levels, until all the LNG has safely burnt away and the flames self-extinguish.

#### LNG FIREFIGHTING

Even during clean-up, care must be taken to use gas detectors, as small pockets of LNG can still be trapped in the ice layers that form at the LNG interface with the high-expansion foam blanket. To see how LNG behaves during these fire tests, Angus Fire's comprehensive HD video "Demystifying LNG" is now available on YouTube.

But when was your system last tested and proven to deliver the correct expansion ratio and flow rate, so it can be considered to be in good working order? How has it stood up to corrosive salt-laden winds on coastal sites? Will it withstand the rigors and intense radiant heat of an LNG fire, and then adequately protect the facility from severe radiant heat exposure for up to an hour, or more?

Maybe it is time to review your current LNG fire protection by seeking advice from experienced LNG fire system design specialists who can review the effectiveness of your current systems. They can also make cost-effective recommendations about improvements that could significantly reduce your risks, should the worst happen and a major LNG spill occurs in the facility. Are you trained and well prepared to effectively control such an eventuality? Who can assist you with controlling an emergency LNG situation?

Perhaps a combined glass block and highexpansion foam system installation may enable lower foam application rates to be used effectively in future, reducing the capacity and number of generators required, for specific installations.

#### **Conclusions**

Extensive testing has proven that specially designed high-expansion LNG foam generators and wind protective hoods, when used with a high performance high-expansion three percent foam concentrate, plus quick and reliable foam proportioning systems capable of mixing foam into the water supply as soon as the system is activated, are essential. This avoids water entering the LNG pool, and provides highly effective control of LNG spill incidents, whether for vapour dispersion or fire control. Much work on application rates has also confirmed that 10L/m²/min provides the rapid and effective control necessary to prevent incident escalation and reduce risk of severe business interruptions.

This research formed the basis for key recommendations in the EN13565-2:2009 standard's section on liquefied flammable gases, and BP's LNG fire protection and emergency response booklet available through the Institute of Chemical Engineers. Both are well worth a read.

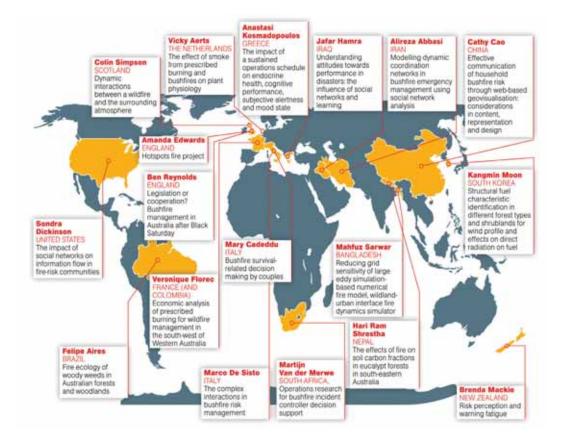
Fortunately there have been very few major fire incidents in LNG facilities, but let us ensure we are not being complacent. Are we taking the risk and possible consequences of an LNG spill seriously enough, in our system designs? Are we possibly relying on inadequate equipment that has not been tested or proven capable of delivering the protection expected, should an LNG spill occur in your facility? Perhaps it is worth getting it checked out, tested and replaced now, if inadequate, before any LNG incidents occur?

Mike Willson is a firefighting foam specialist

For further information, go to www.angusfire.co.uk



#### **Global Views on Wi**





Nathan Maddock
Bushfire Cooperative

Research Centre

Postgraduate students from around the world are bringing a diverse range of skills, experience and knowledge to enhance wildfire research in Australia through the Bushfire Cooperative Research Centre.

he next generation of fire researchers in Australia includes many who have been raised on very distant shores – Bangladesh, Brazil, China, Colombia, England, France, Greece, Iran, Iraq, Italy, Nepal, New Zealand, the Netherlands, Scotland, South Africa, South Korea and the United States.

Designed to build the capacity and capability of the fire industry in Australia, the Bushfire Cooperative Research Centre (CRC) postgraduate program is not just for Australian students. In recent years, the expertise has taken on a strong international flavour, with around one-third of the current 52 Bushfire CRC PhD scholarships granted to students from outside Australia. These international students, from a diverse range of academic disciplines across the physical and social sciences, offer a new perspective to Australia's growing base of fire research. Some are from countries with a history of bushfire, but many are not.

Bushfire CRC Research Manager, Lyndsey Wright, says these students are helping to build a global network and community of fire researchers. "The breadth and depth of our student cohort is an acknowledgement that all the bushfire, wildfire and forest fire knowledge does not necessarily reside in Australia." She continues: "An outside perspective builds a more complete picture. Global insights bring new information and new perspec-

tives to life, and really help to broaden the context. The benefits are more than this. "Whilst English is sometimes considered the language of science, there are also important publications published in other languages."

#### **Global Studies**

The social sciences are not necessarily what would be associated with bushfire research, but the current Bushfire CRC program has a substantial program investigating people's interactions with bushfires and wildfires. Sondra Dickinson, Mary Cadeddu and Ben Reynolds are a few students undertaking higher studies in these areas.

#### Emergency Management through Social Networks

Sondra Dickinson, from San Diego in the USA, is completing her studies through the University of Melbourne. Hailing from another of the most wildfire-prone areas in the world, Sondra was already well aware of the risks these fires pose.

"I'm broadly interested in all emergency management, across all hazards. I have a Master of Science in Emergency Management from San Diego State University, focused on the integration of fire, police and other emergency services as a regional unified group," she says. "My Bushfire CRC research is in the discipline of anthropology —

#### **Idfire Science**



I am looking at how people get information about bushfires through their social networks, which is not the same as social media."

The term 'social network' refers to an individual's relationships with others. It is about personal interactions, in whatever way these interactions occur, such as in person, by telephone or through social media.

"Anthropology is the way to focus on the human element of wildfire," she adds. Her research analyses the use of social networks within making processes that couples make that influence the formulation of a bushfire plan. Similar to Sondra Dickinson, her background involved fire.

"My research in Italy was around arsonists and pyromaniacs. It focused on prevention and treatment of violent fire-related behaviours from first childhood to adolescence. It is a bit different to my work now, but fire is a common element. My research now is the perfect combination between my psychology interests and bushfire."

These students are helping to build a global network and community of fire researchers. The breadth and depth of our student cohort is an acknowledgement that all the bushfire, wildfire and forest fire knowledge does not reside in Australia.

fire-risk communities, to better understand how information about wildfires and relevant risk is transferred and used. She explains: "By exploring how social networks are used to transfer and utilise relevant information, I am considering how informative relationships may carry the potential to be leveraged differently, by adjusting how individuals think about their social networks."

#### **Wildfire Planning for Couples**

Mary Cadeddu has a background in clinical psychology and psychopathology, and hails from Rome, Italy. Her PhD studies, through La Trobe University, aim to identify important decision Mary has examined transcripts of interviews by the Bushfire CRC Research Task Force conducted immediately after the Lake Clifton bushfire in Western Australia in January 2011. She sought evidence as to how couples who survived had approached wildfire safety, and how they decided what to do when they were warned about a possible fire. Additionally, a survey of, and interviews with, couples is being conducted in selected wildfire-prone communities to investigate issues in greater depth.

"My project is about the decisions that couples make in the formulation of long-term wildfire planning and preparation. Most research involved

#### WILDFIRE FIREFIGHTING

in decision-making processes of wildfire, forest fire and bushfire preparation focuses on individuals," explains Mary. "My research is different, as few studies have looked at the decision-making processes of couples, either through marriage or in a de facto relationship."

#### **Lessons from History**

Ben Reynolds' research background is a little different. Unlike Sondra and Mary, Ben, from Middlesbrough, England, did not have a background in fire before undertaking his Bushfire CRC PhD through RMIT University.

"My research background is in history – specifically modern and contemporary European history. It is a bit of a leap to bushfire," said Ben. His research is assessing the governance structure relating to bushfire in Victoria, and evaluating the strengths and weaknesses of each part. He will interview key stakeholders involved in bushfire safety, including Victorian state government personnel involved in bushfire preparedness, CFA staff, and community members. The research seeks to understand how the stakeholders perceive the current approach to bushfire safety and why there has been relatively little additional consideration of a more authoritative approach to individual bushfire preparedness.

very different, but Colin disagrees. "I have taken my computer modelling and mathematic skills and applied them to looking at numerical modelling of fire weather. They sound pretty different, but they are actually pretty similar."

#### **Better Decisions through Maths**

Using his mathematical background in a different way is Martijn Van der Merwe, from Stellenbosch in South Africa. Martijn's studies are based at RMIT University.

"I am applying mathematics and physics to help incident managers make better decisions. Making good decisions saves lives and property," he summarises. Martijn is working towards developing real-time decision-support tools to assist wildfire incident controllers, using operations research methods. These methods can provide a framework to assist in synthesising and analysing information and using it to guide decision-making.

"I want to bring quantitative tools and operations tools that have worked quite well in other areas to incident management for bushfire," he explains. "Information such as in what sequence should jobs be completed in a manufacturing line, where resources should be assigned and where should facilities be located. I want to take these techniques and put them in real-time for an

# Designed to build the capacity and capability of the fire industry in Australia, the Bushfire Cooperative Research Centre postgraduate program is not just for Australian students. In recent years, the expertise has taken on a strong international flavour.

Ben aims to gauge the likely effect if forced compliance with bushfire preparation on residents and communities in rural–urban interface zones was introduced. "There have been one or two crossovers from my previous research," he acknowledges. "I compared civilian preparedness plans during World War II in England to preparedness plans in Victoria for bushfires. In England, plans were developed for workplace-based training for air raids. I think that those lessons could possibly be applied in Victoria to bushfire – why not have residential bushfire training as part of occupational health and safety training?"

#### **From Stars to Flames**

Also from colder climes is Colin Simpson. He is originally from Edinburgh in Scotland and is undertaking his Bushfire CRC PhD through the University of Canterbury in New Zealand.

"I don't have a background with wildfire. I only got involved through this PhD," Colin admits.

"My background is in physics, astronomy and computer programming. I did a Masters in Astrophysics at the University of St Andrews in Scotland."

Colin's project is investigating atmospheric interactions with wildfire behaviour through the application of numerical weather prediction and fire behaviour coupled modelling. "I am looking for interesting meteorological phenomena – things that can affect a fire in situations that firefighters might not expect. It would be really useful for firefighters to know what kind of situations to be aware of where a fire may do something unexpected."

Astrophysics and wildfire research might seem

incident management team and see how these techniques can be used to assist and to develop decision-support tools."

decision-support tools."

Martijn continues: "Incident managers have lots of crucial information they have to process, balancing many complex goals. I hope to be able to apply quantitative techniques to models to assist in this decision-making,"

#### **Smoke & Plants**

The Netherlands does not experience bushfires, but Vicky Aerts is combining her previous forest and nature conservation studies in the Netherlands with her interest in natural disasters through her Bushfire CRC PhD at the University of Sydney.

"If we inhale smoke from a fire, we have to cough to get the smoke out," she explains. "I am interested in what happens to plants. Do they cough too?" Vicky is investigating the effects of smoke from bushfires and prescribed burns on plant physiology. This involves measurement of immediate and short-term effects using leaf-level physiology and longer-term effects using whole-plant responses. A selection of experimental species, fuel types and exposure times are being used in controlled laboratory and glasshouse experiments. Field-based experiments are being conducted to estimate immediate and short-term plant responses to prescribed burning and to scale to a landscape level.

"Previously, I have studied fire management in Sweden," she adds. "My Masters studies in Australia investigated nutrient losses in forests after fire. My PhD is a bit different again."

#### Nathan Maddock is Communications Officer at the Bushfire Cooperative

the Bushfire Cooperative Research Centre

For more information, go to www.bushfirecrc.com



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Jessica King

Devon and Somerset Fire and Rescue Service

# BA Instructor Training

The Training Academy at Devon & Somerset Fire & Rescue Service has introduced a new breathing apparatus instructor (BAI) course to train its own staff and personnel from other fire and rescue services. The course is aimed at delegates who are required to plan and deliver safe and effective breathing apparatus training.

his in-depth course teaches everything required to become a skilled and confident BA instructor. The course allows delegates to learn practically by running their own exercises where they will receive feedback from the course instructors and the other course attendees, allowing the students to leave the course and confidently run an exercise of their own. Students learn through practical exercises, theory based instruction, E-learning and assessments.

The course is designed to imitate realistic scenarios and is very hands-on, so as well as sitting-in on lectures presented by the instructors, delegates will also deliver lectures to their fellow students. Successful completion of the course will lead to a Skills for Justice Level 3 Award in Breathing Apparatus Instruction. This award consists of two mandatory units which include breathing apparatus instruction and delivery in the use of breathing apparatus.

#### **Learning Outcomes**

On completion of the course candidates will be able to demonstrate the required level of competence regarding:

• Breathing apparatus set instruction.

- Delivering a breathing apparatus session.
- Entrapment and set-removal training.
- Completion of legislative documents.Conduct a constructive and meaningful debrief.
- In order to take part in the course students must be competent BA wearers and physically fit to undertake scenario-based training. Personnel attending this course should have or be working towards a qualification in teaching, for example Preparing to Teach in the Lifelong Learning Sector (PTLLS) or an equivalent. Integral to the course is an assessment philosophy that provides evidence of the candidate's individual attainment and there is an initial assessment of theoretical knowledge. Instructors continually assess delegates throughout the course with the aim to ensure all students are progressing and developing their practical skills in a safe and effective manner, and that their theoretical knowledge continues to increase. Prior to the assessments, candidates will be made aware of the required standards.

Main topic areas of the course include:

- Breathing apparatus procedures and equipment.
- Physiology of respiration.
- Heat and humidity.
- Principles of safety.

#### **BA TRAINING**



- Risk assessment.
- Training and exercise planning.
- Restricted access including set removal.

During the restricted access exercise the students are paired off and briefed to enter the smoke chamber on a specific search pattern. They are to navigate their way into the chamber adopting the techniques discussed during the theoretical input. They will then make their way through the tunnel complex to the restricted opening, perform the correct set removal, make their way through the opening, don the set and make their way out.

The course has been designed to give a qualified breathing apparatus wearer the necessary skills and awareness to design, organise lead and instruct a BA session. It will emphasise the skills that are necessary to complete a meaningful BA lesson. The main aim of the course is to give each candidate the ability to plan, resource, deliver and review a BA session in a safe and effective manner.



Jessica king is Training Academy Commercial Support Manager at Devon & Somerset Fire & Rescue Service

For further information, go to www.dsfire.gov.uk/ trainingacademy

Adrian Sellick, who designed the course, says: "I have been on other breathing apparatus instructor courses in the past that teach you about BA sets, in addition to this our course teaches delegates how to become a competent instructor. We want our students to walk away and feel confident to run their own session, this is why delegates are given the opportunity to plan and implement their own exercises during the course."

The ethos of the course is aimed towards firefighter safety and this is emphasised greatly throughout. On 2nd February 2005 during a rescue in an apartment building in Harrow Court, Hertfordshire, two firefighters died in the fire. One of the fatalities

was as a result of becoming entangled in cables during the rescue. This is not the only example of entanglement; this is now becoming a big issue for the fire service and therefore raising awareness and teaching delegates how to best deal with entanglement should become a part of all BA related courses. Entanglement is included in this course and other relevant health and safety issues will be highlighted as firefighter safety is of paramount importance. The five-day course is in-depth and this is in order to cover every foreseeable danger in relation to breathing apparatus wearing

This course will teach students how to go back to their service and train their own staff in how to wear BA for respiratory protection and the best practice for entering and exiting a smoke filled building, having carried out tasks in a safe and efficient manner in line with TB197. It is useful to be aware that there is a document entitled "Breathing Apparatus Command and Control Procedures – operational Guidance" – issued in the UK by the Office of the Chief Fire & Rescue Adviser on behalf of Communities and Local Government, which is undergoing consultation and may well replace TB1/97 in the future.

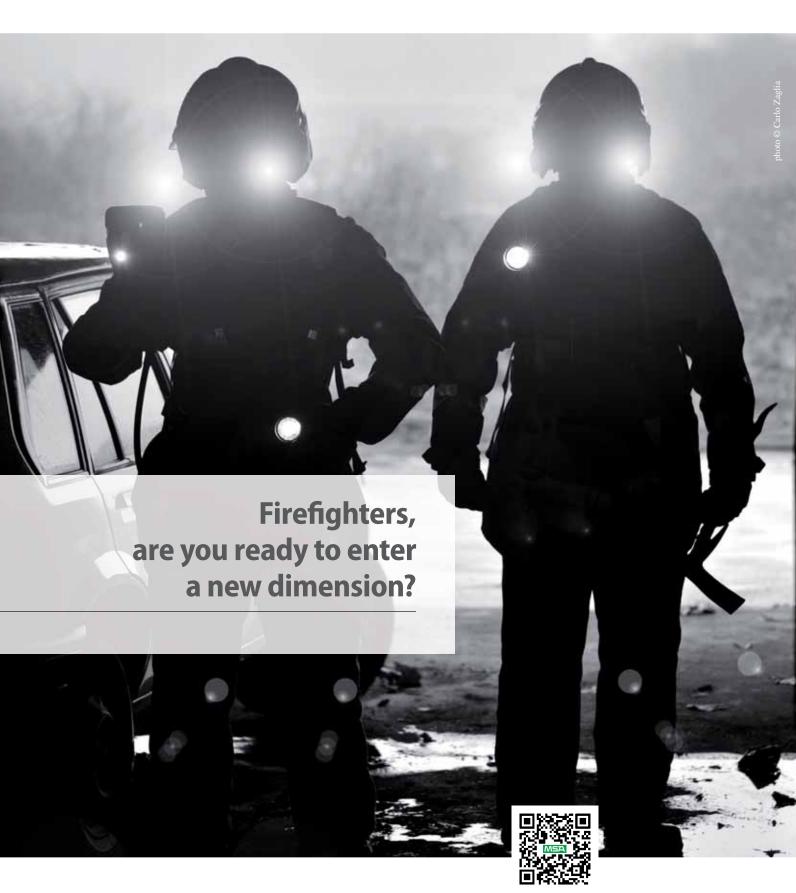
Students will have the chance to take part in a hot fire exercise session and the aim is to provide students with the opportunity to demonstrate breathing apparatus procedures, firefighting and casualty rescue at a simulated incident while working in heat and smoke.

Delegates will be given a real life simulation exercise in which to take part. On successful completion of the course and subject to passing all sections, delegates will have demonstrated a high level of knowledge of breathing apparatus procedures and techniques. They will have their skills and knowledge to describe the technical and operating principles of a breathing apparatus set and will be able to risk assess, plan, prepare, conduct, supervise and analyse practical and resource management exercises.

A recommended follow on to this course is the PPVI (Positive Pressure Ventilation Instructor) and CFBTI (Compartment Fire Behaviour Instructor) courses.

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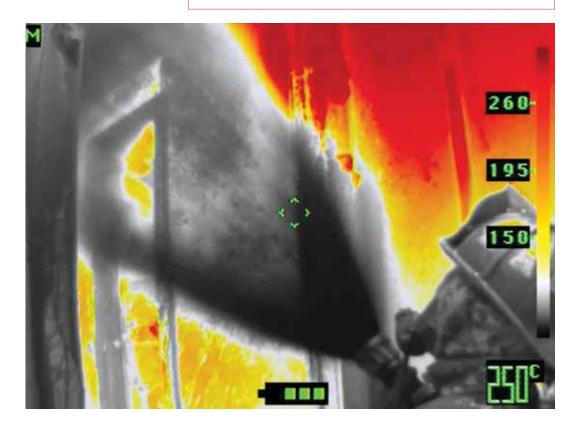


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Andy Slater
ISG Infrasys

Thermal imaging cameras have long since proven their worth in saving lives, and the leading manufacturers are continuing to invest heavily in new and improved technology.

or a number of years now, thermal imaging cameras have become an essential piece of equipment for firefighters. Initially, the fundamental use of a thermal imaging camera was as a navigational tool, helping firefighters to see through dark and smoky conditions in order to see more of their surrounding environment.

This primary function of a thermal imaging camera is highly dependent on the quality of the thermal image being produced, as this is the source of information for the firefighter to work with. While navigation is still considered the primary function, the integration of a variety of extra features has further expanded the various applications of thermal imaging in firefighting.

The added functionality that is on offer is ever changing and improving as newer technologies become available. Some features prove unsuccessful while others are superseded by an improved version, but the features that have become industry standard for TICs are those that enhance the safety of the firefighter, and the people being saved.

Direct temperature measurement (DTM) is one of the earliest examples of this, having been first introduced in 1994. DTM gives an on-screen readout of the temperature being taken at the centre cross-hairs of the camera, giving the firefighter essential information about the surrounding environment, and in turn enhancing his decision making capability.

Since its inception, DTM has now become the standard means of temperature measurement for thermal imaging, although modern day systems are now directly linked to the camera's colourisation so that the user can identify immediately any temperature differentiations. As a guide, the user can identify an approximate temperature of an object just by using the colours, but with the DTM feature installed as well, an accurate reading can also be taken; particularly useful when monitoring the temperature of objects in the scene.

All other temperature-related features offer additional means of temperature measurement. These functions tend to be more dynamic and adaptable to the scene being imaged, enabling



the user to retrieve more information about objects all over the scene, and not just those at the cross-hairs.

Having the ability to identify immediately hidden hot-spots or locate the seat of the fire not only enhances the safety of the firefighter, but also enhances his decision making capability, as well as assisting with the preservation of life and property like never before.

In addition to improvements to the image quality and temperature measurement aspects of thermal imaging, manufacturers have also developed the application of other features such as video recording systems, zoom functions, and interchangeable colour palettes. This enhanced usability of thermal imaging cameras has meant that the focus of its primary function has moved away from being a navigational tool, and instead has become a multifunction, multi-application tool. Furthermore, the introduction of the NFPA 1801 standard for thermal imagers has also impacted on the operational and manufacturing characteristics of the products, ensuring consistency and high quality standards are quaranteed in every case.

These developments have been key in the progression of thermal imaging technology and have led to even more advanced concepts of technological improvement being drawn up for the future. As with all modern-day technology, thermal imaging is constantly being updated, with the

latest models now becoming much smaller and more compact, in spite of the additional features that have been developed to accompany the infrared technology.

The amount of life-saving equipment that firefighters carry not only adds significant weight to their person, but also reduces their ability to manoeuvre in small and confined spaces. As a result, reducing the size and weight of this equipment has become an essential part of the development process, and thermal imaging is no exception. A number of models available now weigh less than one kilogram and the overall dimensions of the products have now been on the decline for a number of

While this undoubtedly reduces the overall weight of the equipment firefighters must carry, the size reductions can often come at the expense of other aspects of thermal imagers, such as image quality. One major size constraint is the LCD displays being used, with some providers opting to reduce the LCD size and therefore reduce the overall size of the TIC. As a result, the TIC's imaging performance capability is compromised due to

smaller LCDs limiting the amount of scene information being displayed. Although a compromise is inevitable at this stage, it is widely anticipated that a more complete and less compromising solution will be available in the near future that would encompass a small, compact design, without a reduction in imaging performance.

In addition to the aspects of thermal imaging that affect the cameras themselves, developments into the way in which TICs interact with today's operational procedures of firefighting exercises, both in a practical sense as well as a functional one, are also being considered.

Accessibility to thermal imaging equipment is paramount to utilising it effectively. As such, having a TIC mounted onto the fire engine itself is a practical means of ensuring it is available for use whenever required. Today's vehicle-mounted units house the ability to also recharge the TIC and spare batteries as well and, since the size of thermal imagers is reducing, so too is the size of the charging devices being used. This has allowed for much smaller charging equipment to be positioned in first response vehicles, as well as fire engine cabs, which has further ensured their accessibility to the firefighter.

In a functional sense, the application of thermal imaging has long been established, however integrating thermal imaging systems with the ability to transmit video to remote locations has







# From the creators of handheld thermal imaging

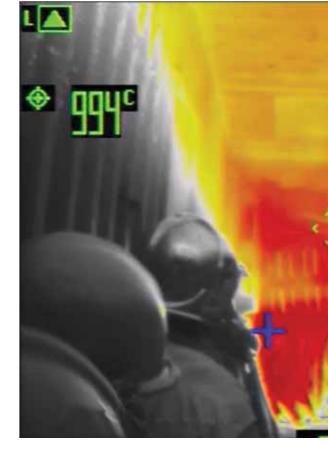
Introducing the world's smallest, lightweight, high resolution thermal imaging camera, the Argus Mi-TIC. As you would expect, this latest innovation from Argus provides crystal clear image quality at extremely high temperatures, whilst at the same time allowing you to clearly see very low temperature objects like casualties. The Mi-TIC is a small format thermal imager that can be easily and comfortably held in the palm of your hand. Its unique design allows rapid fixing to a pocket, BA straps or it can even be stored in a pocket for quick access. With a less than five second start up time and simple thumb operated functions the Mi-TIC delivers a unique balance between industry leading performance and ease of use.

ensured the emphasis of that application is shifting towards communication.

The ability to communicate between a firefighter in the building and the team outside can be of paramount importance to the success of an operation. Incorporating a transmission feature into a thermal imaging camera can provide a means of enabling firefighters on the outside to see what is happening inside.

Transmission systems are not new to thermal imaging, having now been around for a number of years as additional accessory items. However, recent new developments in the technology have enhanced their performance capability substantially, making communication between team members more reliable than ever before.

These systems are capable of transmitting live video from the TIC, to a central command unit in real time to aid decision making. Transmission distances are dependent on the surrounding







environment but some systems are capable of transmitting across hundreds of metres meaning that even in extremely dangerous or large scale operations, the team's ability to communicate over both the radio and through video is not restricted.

As with all developments in thermal imaging, and in the firefighting industry as a whole, the primary objective is to enhance safety. Every new innovation developed has this objective in mind, with the main priority being to enhance the safety of the firefighter using the equipment. As technology improves, so to do standard operating procedures as they change and adapt to accommodate the best possible practices of the day, using whatever equipment is available.

Thermal imaging plays an important role in enhancing a fire-

fighter's safety by enhancing their ability to make good decisions, while also providing a means of navigating and vis-

ualising their surroundings, even in the most extreme conditions. The most significant benefit of using a thermal imaging camera is having the ability to see the unexpected. A firefighting environment is extremely disorientating and as such, a firefighter must be able use their best





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judgement in critical situations. With the aid of a thermal camera, firefighters are able to identify their surroundings, locate an exit route, as well as find any dangerous objects and other potential hazards and threats.

Preserving the life of the firefighter helps to maintain his or her ability to preserve the lives of others that may be victims of an emergency situation. For this reason, fire departments all over the world continue to invest their resources in equipment that can help keep firefighters safe. As a result of this investment, it is important for TIC providers to also invest alongside these fire departments, in ensuring their product is maintained and fit for service at all times.

This investment from manufacturers comes in the way of warranties, services, repairs and after-sale care packages that are becoming more and more important in the purchasing process. As many fire departments all over the world struggle to operate in such a difficult financial climate, and with such limited financial resources, investment in the maintenance of pre-existing products, rather than buying new, is essential to reducing expenditure.

As infrared technology has developed over the years, so has the ability to reduce costs to the consumer. The thermal imaging industry is able to provide a wide variety of products at varying price points to help ensure all customers have access to this crucial equipment. In order to best serve the fire industry, many thermal imaging providers will work with fire departments to ensure best value





for money is always maintained on every purchase they make.

Although low-cost thermal imaging equipment provides a solution to a fire departments requirement for TICs, the reality is that, like in any other industry, cheaper is rarely better, and in the long-term, the products purchased is rarely good value for money. Furthermore, many brigades the world over have input their own thoughts and ideas into the development of thermal imaging cameras, not only to help reduce cost, but also to further enhance the practicality and effectiveness of TICs

this investment is reciprocated by TIC providers in the way of user-oriented developments, good customer service and a strong, long-term working relationship.

In order to avoid tragedy, and to help maintain firefighter safety, manufacturers of firefighting equipment have a responsibility to not only design and produce products suitable for the extreme environments that firefighters are subjected to, but also to ensure accessibility of these products for fire departments of any size, anywhere in the world.

The ability to communicate between a firefighter in the building and the team outside can be of paramount importance to the success of an operation. Incorporating a transmission feature into a thermal imaging camera can provide a means of enabling firefighters on the outside to see what is happening inside.

in a real environment. This special relationship between providers and users has helped ensure that new technologies, ideas and innovations are not only suitable for the fire industry, but they also come preapproved for use in these extreme environments.

Given the emphasis put on a thermal imager's ability to enhance firefighter safety through improved decision making, it is no surprise that such a large number of brigades from all over the world invest regularly in this technology. In turn,

There is no doubting the role thermal imaging plays in the enhancement of firefighter safety, and with so many cost-reduction schemes already in place, infrared technology is now available to more fire departments across the world than ever before. Furthermore, with such a wide variety of firefighting thermal imagers available on the market, and each with a number of unique safety features, enhancing the safety of firefighters has never been more of a priority for TIC manufacturers.

Andy Slater is Sales director at ISG Infrasys

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LET'S WORK.

# Fighting the CBRN





Steven Pike
Argon Electronics

In recent years, the work of the emergency services has become increasingly difficult. Financial cut backs, increasing regulatory burden, and inter-agency co-operation protocols all contribute to placing considerable pressure on individual service personnel, equipment and procedural systems.

his situation is exacerbated by the rapid rise in the breadth and complexity of incidents that emergency services personnel have to address, and by the growing range of skills and knowledge that first responders are expected to retain and renew. Although often overshadowed by more common day-to-day incidents, the delivery of a comprehensive response to HazMat (Hazardous Materials) and CBRN (Chemical, Biological, Radiological, and Nuclear) events requires specialised consideration and attention that can only be neglected with acceptance of extreme consequences.

In preparing for HazMat and CBRN reaction and remediation, training exercises need to be not only

regular, but also challenging. Training should stretch participants, and not permit them to just go through the motions. If trainees are not challenged, they are not alert; and if they are not alert, they are not learning – or, at least, not learning to a level that will assure optimum performance in the face of the most severe of circumstances. Hazmat and CBRN training must encourage the trainee to behave as if the exercise were a real event.

The issue of creating the most realistic exercises for firefighters to learn how to deal with call outs involving toxic chemicals and/or radiological materials, without actually releasing such substances into the environment, has been a perennial

# **/HazMat Threat**



problem. Increasingly, the solution has been to use electronic simulation equipment, such as that provided by Argon Electronics, which now takes the training terms 'realistic' and 'challenging' to a new level.

Highly challenging simulation exercises using state-of-the-art simulation equipment are now taking place in the UK. Firefighters can safely simulate the release of chemical and radiological hazards, and, equipped with Argon simulators in place of the real detectors, participants are able to realistically carry out their roles without risk of harm or damage to personnel, their equipment, or the environment.

The London Fire Brigade (LFB) has been using Argon simulators for almost ten years, and the latest technology development has enabled the service to significantly improve the quality of its response training. Electronic simulation tools are vital for the LFB for a number of reasons. The most immediately obvious is that LFB instructors cannot simulate such as a potentially lethal chemical or

radiological incident by releasing real substances around London's streets and public spaces; even if you could disregard the threat to human health and safety, or the potential insurance costs involved with this type of activity, the expense of remediation alone would be prohibitive.

While there are specialist training facilities available to fire and rescue services, centres able to host Live Agent CBRN Training (LAT) are few and far between, and these are often predicated towards military training. LAT can provide valuable insight and instruction for a limited number of experts, but its specialised nature carries prohibitive costs for generalist training, and may be limited in its ability to engender vital experience of front line first response in the wider public urban environment that is likely to be the arena of a critical real incident for a fire service. For the LFB, simulators enable the safe staging of effective instruction in any environment that is challenging for all the participants, whether conducted in small dedicated groups or as a component of larger scale exercises.

The LFB uses the Argon LCD 3.2e-SIM, a high fidelity Chemical Warfare Agent (CWA) and Toxic Industrial Chemical (TIC) detector simulator for training in the use of the Smiths Detection LCD3.2e. This device responds to both rapidly deployable ultrasound-based sources for simulation of high levels of chemical vapour over extended areas or within buildings, and magnetic-based sources for simulation of point contact contamination. The Brigade also employs the EPD-Mk2-SIM, for training in the use of the Thermo EPD-Mk2 dosimeter, and the RDS-200-SIM for teaching use of the Mirion RDS200 survey meter. Both simulation instruments respond to the same safe gamma radiation simulation sources for integrated training. All of these simulators faithfully replicate the user interface of their respective counterpart detectors to ensure a thorough knowledge of their correct operation.

Simulators offer great flexibility in planning exercises. Instructors can prepare a scenario where the trainees do not know what they will encounter, which is extremely useful because in a real life situation the firefighters who are responding to an alert do not always know exactly what they are looking for. For example, the LCD3.2e-SIM responds to electronic simulation sources that represent chemical vapours, toxic industrial substances or false positives.

Instructors can now manage the detection instrument training of multiple personnel, selecting the parameters for the activation of simulation instruments using PlumeSI, a CBRN/HazMat response training simulator that provides enhanced flexibility and ease-of-use in field exercises and table top training for counter terrorism, HazMat or nuclear incidents.

PlumeSIM is designed on a Windows platform and allows multiple trainees to be managed and monitored from a computer at a central location. The PlumeSIM software enables users to plan exercises on a PC or laptop without system hardware, offering a portable simulation system with

# **CBRN & HAZMAT TRAINING**



easy-to-use menus that can be swiftly set up and used to create a diverse variety virtual emergency scenario.

PlumeSIM enables an instructor to plan a scenario that involves either single or multiple releases of hazardous materials and offers the potential to define a series of release characteristics, such as duration, persistence and deposition, for an extensive choice of substances. The instructor setting the training exercise can even define the environmental conditions that would affect the movement and/or state of the virtual plume during the timespan of the operation.

threat scenarios from deployed personal Player Units, which track their progress using GPS data.

All data is recorded and can be analysed after the field exercise using the after-action exercise review mode; all player movement and simulator activity can be reviewed by instructors and trainees at debriefing, providing individual trainees with detailed feedback on their performance, maximising the potential for the students to learn from their experiences. During both the planning and review modes, PlumeSIM can also be run in accelerated and paused time to firstly evaluate the validity of the scenario design, and then optimise the replayed exercise appraisal within a compressed time period. A pause can sometimes be extremely valuable in allowing instructors to evaluate, test or validate a student's progress and perhaps recommend changes in approach to ensure all participants get the very best out of the exercise.

In addition to its flexibility and ease-of-use, the modular Argon PlumeSIM system is also cost-effective for end-users, since the number of simulation tools used can be expanded as and when budgets permit, and, because all simulators can be used independently of PlumeSIM there is no redundancy of equipment. It is also possible for existing users of older Argon simulation detection instruments to upgrade their equipment for use with PlumeSIM.

Argon Electronics recently supplied PlumeSIM, along with a comprehensive range of CBRN training simulators, to the Police National CBRN Centre (PNCBRNC) in Warwickshire. The PNCBRNC was

Simulators offer great flexibility in planning exercises. Instructors can prepare a scenario where the trainees do not know what they will encounter, which is extremely useful because in a real life situation the firefighters who are responding to an alert do not always know exactly what they are looking for.

The instructor determines the parameters of the exercise using PlumeSIM in Planning Mode, where a common file format image map of the selected training area is utilised. By placing a virtual release source at any location on the map, simulated chemical and/or radiation plumes or hot spots can be created. Selection of environmental factors including the wind direction, its velocity, and temperature can then be made and, on activation of the exercise, an onscreen counter will display the exercise scenario progression in real time. Thus, in as little as a matter of minutes, a complex training exercise can be set up rich with variables that will truly challenge the trainees to think and act as they would in a real life situation.

Trainees can interact with PlumeSIM in three modes: table top mode, field exercise mode and post-event exercise review mode. Table top mode offers the opportunity for trainees to navigate a projected on-screen scenario using a standard gamepad controller, offering a level of familiarisation with the simulators that enables them to gain more from the subsequent field training exercises. Field exercise mode enables students to physically investigate a training area, where PlumeSIM triggers readings and alarms on the simulation tools they carry by locally re-broadcasting the

established in September 2006 as a centre of excellence that oversees the Police's capacity and capability to deal with CBRN incidents, and thus sets the standard for CBRN response in the UK. The contract to supply the PNCBRNC has underlined the importance of CBRN simulation equipment in response training. By carrying out a thorough evaluation of Argon Electronics' simulators, PNCBRNC personnel were able to see at first-hand how the operational flexibility of this equipment enhances CBRN/HazMat training exercises. By provision of these advanced tools with which to 'train the trainers', the PNCBRNC's instructors are now able to deliver an improved capability to counter CBRN/HazMat incidents nationally.

The use of such innovative training equipment has changed the face of CBRN/HazMat response training. These tools offer the ability to rapidly design multiple scenario options including the type of threat, the point of release or delivery mechanism from single or multiple sources, and a full range of constant or changing environmental conditions. As a result, they truly meet the challenges faced by today's CBRN/HazMat response instructors, who must provide the best possible training for an ever increasing number of potential threats.

Steven Pike is Managing
Director of Argon Electronics

For further information, go to www.argonelectronics.com

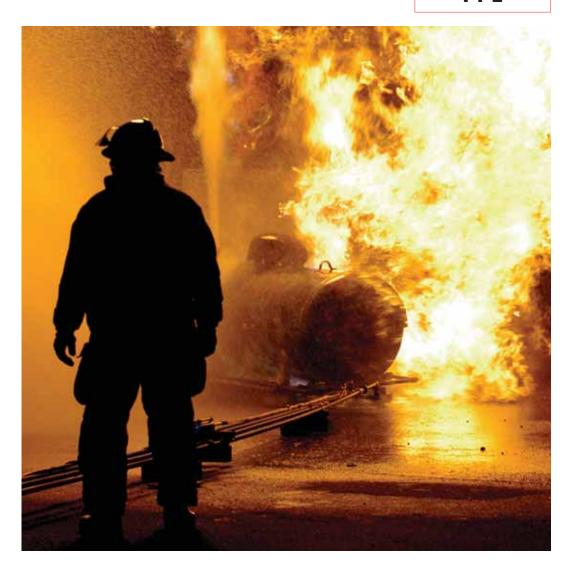


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CBRN training systems









Tom Hainsworth
Hainsworth

# What's Driving the PPE Market?

Manufacturers working in the PPE industry appreciate only too well the huge responsibility which is bestowed upon them. This is not just a responsibility to develop and produce the highest quality fabrics and garments to be worn by firefighters, although clearly this is important. The biggest responsibility is to ensure that the garments worn by our fire services in all the different scenarios they face offer the best possible protection.

hen asked what the number one objective is, my reply is always the same: "To protect individuals that work in hazardous environments from burn injury so they return home safely to their families".

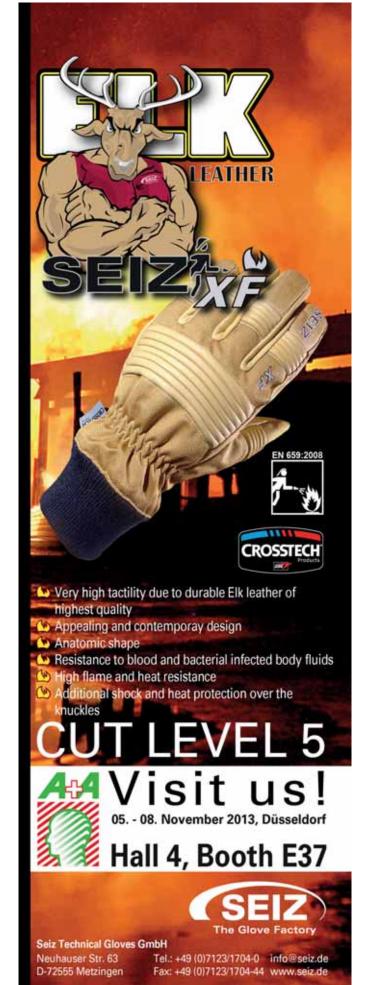
It therefore follows that buyers and specifiers operating in the PPE industry are both incredibly rigorous and demanding in ensuring that the garments selected to be worn by firefighters in their respective territories meet this criteria.

Those responsible for developing the firefighting standards and ensuring that they continue to

be as relevant as possible to the challenges faced by firefighters in different parts of the world are looking for a number of attributes from industry suppliers. All of these attributes are underpinned by the overriding responsibility highlighted earlier – namely, to ensure firefighters are afforded the best possible standards of protection.

One of the most important attributes in an increasingly competitive world is the expectation that manufacturers will continue to demonstrate innovation in their product development. Innovation needs to be backed up by a strong understanding

# **PPE**





of the science behind the performance of the products that have been developed and a thorough appreciation of the risks being faced by the end user. Only by understanding these two areas well, can you properly assess the performance of the innovation in real life.

For example, every product developed by Hainsworth is subject to the most stringent levels of testing in our own accredited laboratory and like other leading manufacturers we pride ourselves on the attention to detail.

In developing products for firefighters around the world, there is a need to give consideration to the different challenges faced by structural and wildland firefighters. The design of fabrics is heavily influenced by the environment in which the firefighter operates and how the garments will be worn. For example, the outer shell of a structural firefighter's kit is designed to minimise the effects of heat stress and protect against the risk of flashover, while the inner lining helps to move moisture away as fast as possible.

However, in the case of the wildland firefighter, there is only one layer which is both the outer-shell and next to the skin and therefore has to prevent heat from getting in while also moving moisture away. All kit has to be robust enough to offer high levels of thermal and mechanical protection while also being light and breathable enough to minimise heat stress.

Heat stress is the biggest killer of firefighters in the world and is a threat to both structural and wildland firefighters. However, the particular design and use of fabrics differs according to the specific environments encountered.

# **PPE**

For example, a firefighter tackling a fire in a burning building will typically be confronted by extreme levels of heat for a relatively short period, whereas a firefighter battling a wildland blaze will be exposed to extreme heat (in the case of the recent wildland fires in New South Wales and Tasmania in Australia temperatures hit 45°C) over a much longer period of time. Heat stress, if not managed and monitored effectively, not only endangers the life of a firefighter but, on a more day to day basis, can seriously harm someone's decision-making ability which, in turn, puts the lives of colleagues on the line.

As highlighted earlier, a manufacturer is expected to have a comprehensive understanding of the science that underpins the development of specific products. The body's internal core temperature is closely regulated and remains within a very tightly defined range from approximately 36°C to 38°C. This temperature range is maintained by controlling the equilibrium between the amount of heat the body produces through physical activity, the amount of heat stored by the body and the amount of heat lost to the surroundings through sweat evaporation and heat radiation, convection and conduction aided by vasodilation.

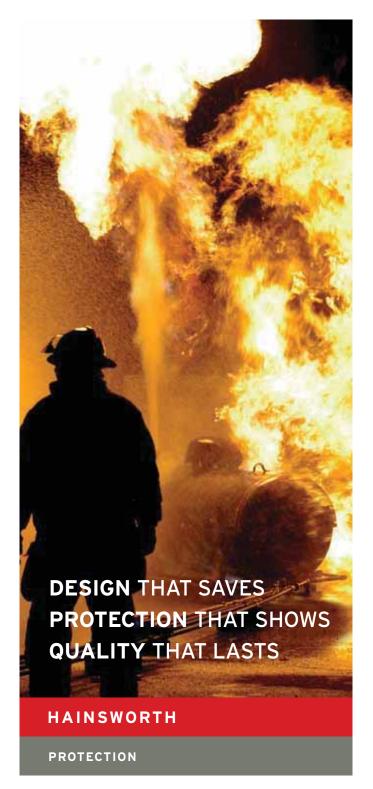
When the ambient temperature of the surroundings rises to above 35°C, heat loss through radiation, convection and conduction stops and the only way left for the body to cool itself is through sweat evaporation. This will also stop if the heat and humidity becomes excessive, causing the body to store the excess heat produced and produce a rise in the core body temperature.

Firefighter standards across the world are not only rigorous in terms of the importance of the levels of protection offered; they also expect manufacturers to go considerably further. One of the biggest challenges facing those involved in the garment manufacturing process is to marry the best possible protection with the best possible levels of comfort.

Our own Hainsworth Titan was developed as a direct result of working closely with fire service personnel and a range of other industry partners. The result is a patented double cloth construction with Nomex on the face to provide optimal thermal protection, abrasion resistance and colour fastness, and Kevlar on the back to provide strength. The kits offer exceptional heat stress management capabilities as well as comfort, wear life and durability, heat and flame protection and chemical resistance.

It is absolutely essential that those involved in the PPE industry demonstrate the ability to work in collaboration. Collaboration is essential because a complete understanding is not held by any individual fire service or member of the supply chain. For example, a firefighter needs to have an understanding of dynamic risk assessment so he can make the right call, while an understanding of the human body and the science behind burn injury is also beneficial to aid the development of PPE standards. Meanwhile, the garment manufacturer needs to understand fit, comfort and the relationship between that and protection, while a fabric innovator needs to have an appreciation of all of these requirements as well as an in-depth understanding of how different fibres react in different environments.

Quality control is another important requirement



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ensuring that the materials used in manufacturing process are from reputable sources. For more than 200 years, Hainsworth has been importing Australian Merino wool for use in its Yorkshire textile mill.

The qualities of Merino wool have been known for centuries, not least its ability to regulate temperature to keep you cool when it is hot and warm when you are cold. Until the late 1980s and later elsewhere, felted Merino wool cloth was used in the manufacture of firefighters' PPE, but while it was undoubtedly a great fibre, a major downside was that it held too much moisture and consequently became heavy and wet for the wearer. Now, thanks to advances in textile production and finishing, the many benefits of wool are making a comeback into the world of PPE, but with a modern twist. Australian Merino wool has a big future in the manufacture of firefighters' kit. An example of this is Hainsworth Eco-Dry, a range of lining fabrics incorporating the many benefits of wool to provide today's firefighter with the highest possible standards of comfort when wearing their

The unique structure of wool offers distinct properties not mimicked by any other natural or man-made fibres – properties that offer many benefits to the wearer and that will not wash out or decline over time. Another important considera-

tion is value – but the right kind of value. There should be no place in the PPE industry for suppliers hoping to make a quick profit or achieve a short-term gain. Anyone who does go down this route will be found out quickly. Ultimately, it is the companies that take the long-term view, and invest serious time in properly understanding the requirements of our firefighters that will build and sustain the lasting relationships.

Value should be about understanding the whole life cost of a product. For example, a product with better durability may cost more at the beginning but over a period of time, it will give far greater value than an inferior product which cost less at the outset. There are a number of reasons why this is the case, not least the fact that garments of greater quality usually last longer. But one of the other trends we have identified is that firefighters themselves are more likely to respect the products they are wearing if the manufacturer has taken the time to engage with them, listen to their particular needs and provide them with PPE that they are proud to wear. Just as firefighters know when they are being given quality garments, they also know when the garments they are being asked

to wear are of an inferior standard.

We live in challenging times with the fallout from the global economic crisis still reverberating. Budgets are under scrutiny and fire services everywhere are under intense pressure to find cost savings wherever possible. The challenge facing businesses operating in the PPE industry is to continually demonstrate that the fabrics and products that they are bringing to the market offer value for money – not in the crudest sense of the cheapest in price, but in the more sophisticated sense that they provide long-term value for money.

From our own ongoing research of the market, relationships with partner organisations and engagement with firefighters in different countries, we are confident that criteria such as innovation, quality control, durability, comfort and breathability allied to protection, class-leading products and customer care all remain as important as ever in the procurement process.

If the industry can maintain these high standards then everyone involved in the development of PPE will know that their collective efforts are doing the most important job of all – protecting individuals working in hazardous environments so they can return home safely to their families.

That is a common goal of which we can all be proud.

Tom Hainsworth is Managing Director of Hainsworth

For further information, go to www.hainsworth.co.uk



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DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

# ELECTRIC MODELS

Model	HP (	Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
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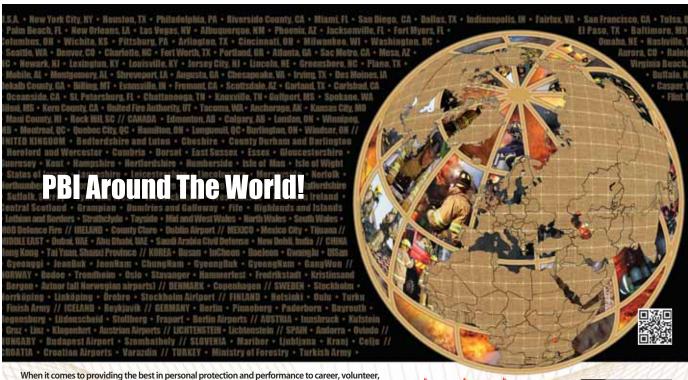
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# **HIGH-RISE EVACUATION EQUIPMENT**





**Graham Collins** 

# Evacuating High-Rise Buildings

Every time we see the horrifying images of the World Trade Centre's twin towers disintegrating in front of our eyes, we must surely ponder the terror and dread experienced by of those trapped in the buildings in the seconds before they died. It has left a legacy in terms of the challenges of high-rise building evacuation that are as real today as they were in 2011. And the question is still being asked: "How can people trapped in these buildings be evacuated?"

chieving safe evacuation from any building is a challenge, both for occupants of the building and emergency responders attending the incident, but probably not more so than in high-rise structures that today punctuate the skyline of just about every major city across the world. The reality is that designing and constructing new buildings to achieve total safety in the event of a major fire or terrorist explosion is just about impossible; with many existing high-rise buildings the situation is worse – we have no option but to work to overcome any barriers to safe evacuation that may have been designed-in. The inevitable consequence is that considerable time and energy has gone into devising evacuation solutions that overcome these challenges or at least go some way towards minimising the casualty toll.

However, before deciding on a solution – be it partial or complete – it is important to take a close look at the nature of high-rise buildings and how we behave in them in an emergency. The World Trade Centre tragedy is probably the most researched and analysed evacuation challenge of all time, so what barriers to safe evacuation have been exposed?

Evacuation via a staircase is, in many instances, the only option. However, the limited capacity of stairs in relation to the potential number of people attempting to escape means that, even if the staircases have not been engulfed in flames and are a safe exit route, it will soon become gridlocked by an ever-increasing number of people attempting to reach safety. This, in itself will increase panic and may well lead to life-threatening crushes. It

# **HIGH-RISE EVACUATION EQUIPMENT**

will also possibly deny firefighter's access to the fire, potentially resulting in it spreading and entrapping more people on higher floors in the building.

This reliance on stairs for safe evacuation is, of course, even more questionable for any unaided physically or mentally disabled occupants that may be wheelchair-bound, partially sighted, blind or deaf. The problem is not eased where elevators are still in operation. While some high-rise buildings do incorporate shelter-in-place "areas of refuge" their capacity is limited and, in the case of the World Trade Centre collapses, would have proved to be valueless. In the majority of cases, shelter-in-place facilities still require the occupants to be evacuated at some stage.

Phased evacuation, aided by the use of voice alarm systems, can make a valuable contribution towards effective evacuation. This phased evacuation option is, of course, unavailable to those trapped and isolated above the fire – as was the case for many in 9/11 – and, in any event, time may simply not permit the phasing to be fully accomplished before lives are lost. It is worth remembering that, for those lucky enough to escape the World Trade Centre buildings in New York, the mean length of time to descend to the ground for WTC 1 was 40 minutes and for WTC 2 was 22 minutes.

## **Evacuation Options**

In an attempt to offset these challenges, fire engineers, architects, developers, owners and occupiers of buildings are looking at alternative options to achieve safe and swift evacuation from high-rise buildings and a number of solutions are now available. It has to be pointed out however that each solution has to take into account the particular design characteristics of the building for which it is intended.

In some instances, the challenges increase as the number of floors gets greater and as the building gets higher. Some solutions are focused solely on the safe evacuation of single occupants, others on evacuation groups of people, while others still additionally assist the emergency services in delivering firefighters and firefighting equipment to the upper floors of a building.

The available solutions fall into two general categories: equipment for the "internal" evacuation of individuals, and systems for the supplementary external evacuation of greater numbers of building occupants.

### **Individual "Internal" Evacuation**

There are a number of options on the market, the majority of which are aimed at safely evacuating mobility impaired or handicapped individuals. These include a number of different designs of stairway evacuation chairs, together with various sheets, mats and sleds that both encapsulate and protect the occupant. Evac Chair (www.evac-chair.com), a US-based company, is one of the leading providers of this type of equipment, which is used extensively in hospitals and nursing homes around the world.

# **Supplementary External Evacuation**

While there are other systems on the market, such as escape chutes and rescue climbers, the most popular supplementary external evacuation

systems generally comprise either controlled decent devises or platform rescue systems. One of the leading manufacturers in this field is another US-based organisation, High Rise Escape Systems (www.hres.com).

### Controlled Descent Devices

Controlled descent devices or CDDs look like, and work in a similar to a pulley – as one side goes down lowering the building's occupant in a protective "evacuation suit" that offers flame and heat protection, the other side comes up ready for the next user. This process is repeated until all occupants have been evacuated. The CCD descends at a speed of between one and two metres a second, meaning that a descent from 20 floors up takes around just 60 seconds. They have either portable or fixed-mounted anchoring systems to allow for rapid "pre-planned" or speedy "unplanned" attachment to the structure.

### Platform Rescue Systems

Platform rescue systems (PRS) move vertically along guides or other means on the exterior of a building and operate in much the same way as an elevator. They are installed inconspicuously on the roof of a high-rise building and, during an emergency, cabins automatically deploy and lower to the street level.

First responders board as they arrive at ground level and control the fire-protective cabins as appropriate for the given emergency. They can deliver up heavy hose loads, fresh air tanks and much needed supplies, while evacuating people on the way down. These systems can evacuate dozens of people from different floors simultaneously, and some can hold up to 30 people in each cabin and incorporate up to five cabins. The system repeats this cycle, transporting firefighters and equipment up and into the building and evacuating building occupants to safety.

## A Culture of Safety

Safe evacuation relies on more than merely having the equipment in place.

Good housekeeping is absolutely essential to ensure that evacuation routes are not blocked, that emergency lighting is in perfect working order, and that there is an accurate count of the people in the building at any one time. Signing in and out may be irksome, but it avoids risking firefighters' lives seeking for someone that may not even be in the building. Communication is also imperative.

Also important is for the building's occupants to be fully aware of the evacuation procedures and equipment that is in place; for that, training is vital. It is, with the wisdom of hindsight, astonishing that in "The World Trade Centre Evacuation Study", Principal Investigator, Robyn R.M. Gershon, stated that 94 percent of the World Trade Centre's occupants had never exited the building as part of a drill, that 82 percent had never been provided with evacuation plans, and that 74 percent were never provided with written fire safety instructions. He went on to conclude that the factors significantly associated with length of time to evacuate included a low level of knowledge, a lack of emergency preparedness, multiple sources of information, and overcrowding on stairs or in lobbies.

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# Preparing with th Standards



In many rapidly-developing regions worldwide, in particular the Middle East, you might be surprised just how many large scale industrial, petrochemical oil and gas facilities are in operation or under expansion or construction. In many respects, it is relatively easy these days for an engineering project contractor or EPC to put a refinery or petrochemical plant almost anywhere they choose, within reason, few engineering projects are insurmountable and EPCs have become very good at this.

# **Ashley Price**

Fire Science Academy – Kingdom of Saudi Arabia

nevitably, with new construction and expansion, comes increase of scale and personnel. An increasing 'scale factor' (higher capacity processing, storage and handling facilities) means everything becomes big, sometimes really big! If the 'scale factor' is increasing, so too does the human factor, which is the establishment of trained personnel through a broad spectrum of skills and qualifications required for efficient, safe facility operations.

One can immediately visualise the knock-on effect for emergency response, asset protection and life safety. An increasing 'scale factor' means more potential risk derived from greater quantities of hazardous materials being processed or handled through much larger elevated industrial process unit structures that, of course, are powered by larger high voltage electrical supplies or initiated by larger furnace or boiler fuel supplies. An increasing human factor means more potential risk for life safety, in particular as the potential hazards are still the same, simply on a greater scale. Our requirements for HAZMAT response, technical rescue and industrial fire control are clear, or are they? We will address this later in the article.

The majority of industrial, petrochemical oil and gas facilities throughout the Middle East and, for

the most part, a sizable proportion of the world, utilise National Fire Protection Association (NFPA) standards for asset and life safety. In some instances, compromises are met, be they due to regional regulations or joint venture companies with different regional standards practice establishing a jointly operated facility. This can be an adventure all in itself.

NFPA however (this may be stating the obvious), is not just a set of standards for life safety and fixed fire protection; it also happens to cover a multitude of standards specifically directed at establishing job performance requirements for both professional and volunteer emergency responders. However, what is sometimes surprising is how often the less appropriate specific NFPA standard are selected, or in some instances not selected at all by the industrial sector for emergency response.

To temper the above statement, it should be added that there are often many dynamics that affect the choice of training program and intended level of preparedness and competency required. Often, local regional authorities will not necessarily follow NFPA standards; however, they will acknowledge an industrial facility that does. The key issue here is however, there may be no

# e Right Training

regulatory enforcement from the regional authorities. Also, if an industrial facility is interpreted as the 'authority having jurisdiction' (AHJ), then that facility or entity should in theory become selfregulatory and enforce its own standards of preparedness. Usually, an industrial facility is audited by an insurance company and very often consultant assessors are utilised from different backgrounds and levels of experience with standards. However, keep in mind, not all insurance companies and assessors come from the United States, from where NFPA emanates.

To further try and explain why less appropriate training standards may or may not be adopted is regulatory reaction. The Piper Alpha disaster in the North Sea in 1988 prompted the Cullen Inquiry and drove dramatic changes to safety regulations for offshore operations. In 2003, the Idemitsu fire in Hokkaido, Japan prompted a major government inquiry and drove dramatic changes to preparedness that became mandatory for all industry within Japan. No doubt, there will be changes

post Fukushima. Much like the aviation industry, it often takes a disaster, loss of life and assets to prompt a change or clearer path of future action.

Typically, if it is up to an industrial facility to

manage its own preparedness for emergency response, there are a few options. Some employ full time professional fire and emergency response personnel (the fire brigade), some combine full time professionals (usually staff and technical level) with volunteers from company operations (usually shift operators), some are completely volunteer and create what is often called the Emergency Response Team (ERT) for a specific facility.

So, what are the appropriate standards for a site-specific industrial ERT group?

Very often. I am asked about training individuals to NFPA 1001, Standard for Firefighter Professional Qualifications. This is the standard to which all municipal firefighters are trained within the USA, volunteer or full time. While this is an excellent standard and a prerequisite for a professional (non-industrial) firefighter, it does not cover the array of skills and knowledge required for response scenarios that might be faced within an industrial facility. An industrial fire chief, officer or technician will inevitably have this qualification; however, in addition they will or should be qualified for NFPA standards specific to industrial response. NFPA 1001, is a long and difficult training program (anything from nine to12 weeks full time study) to implement with an ERT group made up from a shift-based workforce that operates at an industrial facility.

The NFPA 600 Standard on industrial fire brigades is the starting point for ERT groups concerned with



industrial response at their own facilities. However, it is only for fire emergencies. This standard is for operation, training and equipping of a fire brigade, it sets criteria for an ERT purpose, membership, organization, function, training and safety. There are really no job performance requirements or JPRs for individual brigade members specified within this standard, the JPRs to which individuals are trained comes from other NFPA standards.

To visualise the overall training standards needed a little more acutely, let us theorise some emergency response scenarios.

- Following an overload and subsequent explosion, pressurised fires have broken out at various points on the second level of a processing unit. Access to the shut off points for the process can only be achieved using hand lines. The response team must shut off valves and prevent further fire exposure to other vulnerable areas of the process unit.
- A faulty rim seal on a floating roof tank has unknowingly been allowing both liquid and vapour leakage. Somehow, the seal area of the floating roof tank has ignited and there is no fixed system on this tank to extinguish the seal fire. Before the situation worsens, a response team must quickly ascend the tank with a water line for protection and a foam line for extinguishment.
- A small in service tank has caught fire in an area of the facility where the firewater system is currently out of action due to maintenance. Although a smaller size tank, there is no cooling in place and the longer it burns, the more chance there is of the liquid boiling-over and spreading in to a spill fire. There is a water source approximately 150 metres to 200 metres away. However, the only way to access this water is by drafting operation using a pumper (the pumper does not carry sufficient water). The response team must establish operation of the pumper from draft, establish an LDH supply line to a distribution manifold, cool and attack the situation with water and foam.





- A service technician working on a gas separator has collapsed for no apparent reason. Operators have called the emergency and have declared they are about to go and get him themselves. The responder on call must deal with the situation and coordinate the correct rescue plan.
- A tanker with an unknown hazardous material has been involved in a crash and is leaking. The tanker driver who attempted to stop the leak has been overcome with fumes from the hazardous liquid and is unconscious. The event is taking place in close proximity to several occupied areas of the facility. The response team must identify the hazardous chemical, establish an isolation zone, if necessary, and rapidly execute its tactical approach for a rescue.
- An electrical technician was inspecting high voltage electrical lines within a facilities service tunnels. His exact whereabouts are unknown within the tunnel; all that is known is his point of entry in to the tunnel system. There was a power surge and outage, there is no lighting within the tunnel network and fellow employees have reported a burning smell. The response team must conduct a search and rescue.
- Fire has broken out in a hazardous materials warehouse. Several people that work in the warehouse are currently unaccounted for. The warehouse supervisor is on scene and he has reported that some drums inside the warehouse may have burst or even exploded. He is very concerned about a segregated area of the warehouse that has highly volatile product stored within it. The warehouse has zero visibility due to smoke and is scattered with debris from the fire or fires. As a major incident, an ICS command post must be established, on scene information gathered and, following rapid strategic evaluation, a tactical approach be implemented.
- A welder conducting hot work on an oil storage tank that had a cocked or jammed floating roof with vapour space under it has caused an explosion in the tank by igniting the vapour with welding sparks. During the explosion, the welder, along with his safety supervisor, was blown off the platform. Although both men were tied off with safety lines, only one man can be seen dangling from his safety line off the tank. The tank has become fully involved. The victim was seen waving for help and seems unable to assist himself, possibly due to shock or injury. There is a pre-plan and available equipment resources

for tackling extinguishment of this tank, however, the issue of rescue and accountability must be considered before action is taken.

A distillation tower has ruptured due to metal fatigue and a resultant pool of product has leaked in to the under grating of a CCR complex. Somehow the liquid found an ignition source, setting the tower alight as well as causing a fire directly under a high pressure vessel. The vessel relief valve was faulty and the vessel has burst, the shockwave from which has weakened flanges and other vessels within the complex setting it ablaze. An operator was knocked unconscious during the blast, however, he came around and with his egress access away from the complex completely cut off by fire, he has taken refuge as best he can away from impinging flames. The control room managed to shut the complex down, however, residual product and pressure is still creating an extreme hazard and the trapped operator will not last long amidst the fires. The movement of flammable product through the under grating drain system is not a good situation; if not controlled the drain system flowing towards nearby storage vessels could create an exposure risk expanding the incident. Action must be taken to rescue the operator and secure the facility.

These are all probably very real and soberingly familiar possibilities that may be faced in an industrial environment; many of these scenarios have happened.

From a ERT member training standpoint, for competent response all ERT members would require at a minimum, training in hazardous materials awareness & operations (NFPA 472), industrial fire brigade member incipient, exterior and interior (NFPA 1081) and confined space rescue awareness & operations (NFPA 1006). It is important to keep in mind that if and when an incident occurs, in an industrial setting it is not always simply a fire only or rescue only response that needs to be coordinated. The risks of fire, hazardous materials and rescue events occurring at one time during an incident are high.

There are a couple of major advantages for an industrial entity to use these standards; one is that they are relatively short courses, but certainly no compromise on JPRs, just simply tailored to industrial response. The second is that the standards are very well documented and JPRs clearly stipulated which makes documentation for safety and insurance audits significantly easier, providing you can provide a documented training plan to these standards of course.

There are other standards for specialized roles within an industrial ERT group, for example hazardous materials technician or specialist (part of NFPA 472), high angle rope rescue technician or specialist (part of NFPA 472), even pumping apparatus driver operator (NFPA 1002). This article does not cover everything, however, it does highlight the essentials or basic levels of standards based training you should consider.

**Ashley Price** is Vice President at the Fire Science Academy – Kingdom of Saudi Arabia

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# **USAR COORDINATION**



# USAR Exercise Trials New UN Coordination System



James Morton
Hampshire Fire &
Rescue

Search and rescue personnel from around the world have taken part in a major international training exercise in the UK.

n earthquake scenario was simulated at Fort Widley, a 19th century defence complex high above the port of Portsmouth in Hampshire on England's south coast. The exercise was hosted by UKISAR (UK International Search and Rescue) and supported by UKAID, an initiative of the UK government's Department of International Development.

Specialist search and rescue personnel from as far afield as the USA, Australia, Belgium and the United Arab Emirates joined over 140 UKISAR team members for the four-day exercise called Exercise Tusker.

Many of the experts taking part had been deployed to recent disasters in New Zealand, Haiti and Japan. In total, more than 200 personnel were involved in the full-scale exercise.

One of the main aim of the exercise was to trial aspects of a new UN coordination system, being developed by the Operations Working Group of the UN's International Search and Rescue Advisory Group (INSARAG). The new methodology aims to strengthen co-ordination systems and standardise search and rescue processes across all countries to achieve better collaboration in disaster zones.

Among the international participants was a specialist USAID co-ordination team from Fairfax County and LA County's USAR team, who specifically simulated the strategic element of the system. A 100-strong UKISAR team and a 35-strong B-FAST (Belgian First Aid & Support Team) contingent from Belgium were able to test the field co-ordination tools in realistic conditions and also test the sector co-ordination portion of the system.

Group Manager, Pete Crook, from Hampshire Fire and Rescue and UKISAR, who co-ordinated the exercise, said: "This was an ideal opportunity for USAR teams to come together and practice in realistic and challenging conditions." He continued: "We can be mobilised to a wide variety of international disaster zones so it is critical that personnel have the opportunity to train in realistic scenarios such as this mock-up of the aftermath of an earthquake."

The participants were able to field test most elements of the proposed new UN co-ordination system for the first time. While this was very successful, it did provide some really useful learning points to improve this further.

Battalion Chief John Boyle, from LA County

# **USAR COORDINATION**



Fire Department, who has worked recently at earthquakes in New Zealand and Haiti, was among the USAID crew attending the exercise. He said: "We were exercising the new methodology in co-ordination of urban search and rescue teams in a large disaster. This event helped to bring more understanding and awareness of this new methodology of co-ordination, breaking widespread disasters into manageable pieces."

The new methodology has a few key principles that were tested at Exercise Tusker:

- Adding specific USAR co-ordination expertise into an On-Site Operations Coordination Centre (OSOCC).
- Sectorising large incidents using established 'spans of control' principles and deployed teams as sector co-ordinators.
- Standardised and clearly defined 'levels' of assessment, search and rescue activity to achieve universal clarity of the operations being carried out.
- Standard co-ordination tools to be used by all teams to make gathering, sharing and using essential information effective.
- A new marking system as an integrated part of the co-ordination system.

Exercise Tusker followed up a new INSARAG course aimed at improving the standards of international USAR teams that was also hosted in Hampshire earlier in the year. The course aimed to strengthen the INSARAG External Classification

(IEC) system by training the key people involved.

The IEC system is a unique process where teams voluntarily put themselves forward for assessment by USAR experts from other countries. This 'qualification' is fast becoming the international benchmark that USAR teams aspire to and reflects the goal of improving the co-ordination of disaster response.

Uncontrolled mobilisation of multiple USAR teams of differing sizes and capabilities to international disasters has previously caused serious problems. But the growing number of UN-classified teams that provide a full range of standardised capabilities and trained to help with coordination appears to be changing this.

Pete Crook, also a member of the INSARAG Operation Working Group, said he was confident that the combination of strengthening the IEC system and an improved co-ordination methodology would leave the international search and rescue community in a far stronger position.

He commented: "Events such as those that struck Haiti and Japan seem to be increasing, not decreasing, and the challenge on the ground gets ever more complex. We received extremely positive feedback from all the participants on how realistic the scenarios were and how much valuable experience they gained from the exercise." He concluded: "We achieved all of our objectives from the exercise and hopefully this will strengthen worldwide rescue response in the future."

The new methodology is being refined and tested further at exercises in the coming year and it is hoped that the final version will be approved by the annual INSARAG Team Leaders meeting in Holland in September 2013. Implementation will then follow but many teams that have seen the draft version have already begun training with it.

James Morton is Senior Communications Officer at Hampshire Fire & Rescue

For further information, go to www.hantsfire.gov.uk

Exercise Tusker was named in memory of John Taylor, a highly regarded Hampshire firefighter/medic and member of UKISAR who sadly succumbed to leukaemia only months after returning from the Haiti earthquake. Tusker was his favourite beer.

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# The A to Z of BA C

What is the difference between a pump and a compressor? Sometimes the words "pump" and "compressor" are used interchangeably, but there is a difference. A pump is a machine that moves a fluid (either liquid or gas) from one place to another, while a compressor is a machine that squeezes a gas into a smaller volume and (often) pumps it somewhere else at the same time.

# **Ian Bartlett**

Devon and Somerset Fire and Rescue Service

hile pumps can work on either liquids or gases, compressors generally work only on gases. That is because liquids are very difficult to compress. The atoms and molecules from which liquids are made are so tightly packed that you cannot really squeeze them any closer together (an important piece of science that is put to very good use in hydraulic equipment).

There are many different types, sizes and manufacturers of Breathing Apparatus compressors.

Positive-displacement air compressors work by forcing air into a chamber where the volume is reduced to compress the air. Piston-type air compressors use this principle by pumping air into an air chamber through the use of the constant motion of pistons. They use one-way valves to guide air into a chamber, where the air is compressed. Rotary screw compressors also use positive-displacement compression by matching two helical screws that, when turned, guide air into a chamber, where the volume is reduced as the screws turn. Vane compressors use a slotted rotor with varied blade placement to guide air into a chamber and compress the volume.

Negative-displacement air compressors include centrifugal compressors. These use centrifugal force generated by a spinning impeller to accelerate and then decelerate captured air, which pressurises it.

There are two main types of air compressor pumps: oil-lubricated and oil-less. The oil-less system has more technical development, but is more expensive, louder and lasts for a shorter time than oil-lubricated pumps. The oil-less system also delivers air of better quality.

The importance of air purity in breathing air systems cannot be over stressed. The presence of contaminants such as carbon monoxide, carbon dioxide, oil and water in the air stream can be hazardous or even lethal. The acceptable levels of contamination in breathing air are defined in a number of international standards.

The cleanliness of the compressor room and charging areas and the available facilities are of paramount importance and Devon and Somerset Fire and Rescue Service has recently carried out a review of all of its compressor rooms to bring about improvements and standardisation.

# **BA Compressor Room Requirements**

All BA compressor and charging rooms are to be maintained to the same high standard as a minimum, in line with this policy. The aim of this Service Policy Document (SPD) is to set out the organisational arrangements to achieve this standard.

A set of suitable guidance notes, prompts and signs that include:

- A pictorial chart explaining the various elements of the compressor and how it is to be used.
- A list of instructions in relation to working within the compressor room.

### **Personal Protective Equipment**

In addition to your normal PPE:

- Four sets of hearing protectors.
- Four sets of safety goggles.
- Suitable storage for the hearing protectors and goggles and clearly signed to that effect.

### **Compressor Logbook**

The compressor log book is be kept in a dedicated storage location and be easily located. It should be completed on each occasion recording all the necessary elements of the outcomes of the test or use of the compressor. The cylinder's 'Brigade' number is to be recorded.

This information is to be subsequently transferred to the electronic recording system on the Intranet.

### **Cleanliness**

The charging room, compressor room and the compressor itself is to be maintained to a high level of cleanliness in line with the appendix 'A'. All areas are to be kept clear of unnecessary storage.

# Storage

Only items directly associated with the cleaning and servicing of BA sets are to be kept within the storage provision in the BA servicing room/area.

### **Compressor Rooms**

Only items directly relating to the servicing and maintenance of compressors is permitted to be stored within that area. Permitted items must be kept to a necessary minimum. No other storage is permitted.

### **Ventilation**

The compressor is to be provided with both low- and high-level natural ventilation and be signed on the outside of the premises with a sign stating: "BA Compressor – Keep Clear" or similar.

The vents for the compressor should be sited in a position that is free from airborne contaminants such as dust, vehicle exhaust emissions or outlets from boiler flues. Internal mesh should be provided that will prevent the ingress of rodents, while not interfering with the air flow to the compressor. Where necessary, the external area adjacent to the vent may need to be hatched in yellow paint to prevent vehicles from parking too close to the vent. This may be provided in conjunction with the previously mentioned sign.

# ompressors

Mandatory 'Hearing Protection' safety signs should be posted both within and external to the compressor room.	
Mandatory 'Safety Goggles' safety signs should be posted both within and external to the compressor room.	
Suitable road markings (yellow hatching 2m x 2m) should be marked next to Compressor room ventilation grids to prevent vehicles parking next to the grids with the their engines running.	
A 'No Smoking' sign should be posted externally to the compressor room.	
The compressor emergency stop button should be clearly identifiable on the compressor by means of a suitable safety sign.	STOP
Where supplied, the emergency stop button positioned outside of the compressor room should be suitably signed.	COMPRESSOR EMERGENCY STOP
All labels for the gauge and charging valves should be clearly signed.	
4 pairs of Service issue hearing muffs should be provided within the compressor room for use by personnel working within the area.	
4 pairs of Service issue safety goggles should be provided within the compressor room for use by personnel working within the area.	-00
A Service issue box/container should be made available for the stowage of the above mentioned PPE.	
The BA Log Book (and associated paperwork) should be stowed in a prominently placed, wall fixed, A4 rigid pocket.	

Parking should be controlled in order to prevent any vehicle parking within two metres of any intake vent.

# Maintenance

The compressor is to be appropriately maintained by a suitably competent person and made the subject of a suitable maintenance contract. It is expected that this will be carried out by an external provider. Local servicing support will be carried out by competent staff as necessary.

### **Enclosure/Separation**

Where practicable, the compressor and the charging room should be separated by a suitable noise attenuating barrier.

### **Safety Signage**

The following safety signs are to be displayed in a conspicuous position at eye level, both internally and externally to the room. The signs are to reflect a mandatory instruction and conform to the Safety Signs and Signals Regulations and they are to state that hearing protection must be worn while the

compress is in use and that eye protection (safety goggles) must be worn whilst the compressor is in use.

Recent experience has indicated that, due to the potential risk (albeit small), that the charging hose within the charging room could burst, this will also need to apply to the compressor rooms that are separated from charging rooms. A further safety sign is to be provided stating that the servicing of BA sets should not take place within the charging room while the compressor is working unless hearing and eye protection is being worn.

Where the compressor and charging rooms are separate then both rooms are to be provided with the PPE signs referred to earlier. All emergency stop switches, as well as isolating switches, are to be suitably signed.

# **BA Cylinder Charging Racks**

The charging racks for the cylinders are to be suitable in size and suitably located. They are to have been made the subject of a manual handling assessment for the handling of the cylinders into

# COMPRESSORS

and out of the racks. The rack should be positioned and charged with the valve uppermost without the charging hose being kinked or unduly bent

All cylinder racks should be securely fixed within the compressor room.

### **Lighting Levels**

The level of lighting within the compressor and charging rooms is to provide a high level of light with minimum shadowing. It is considered that 500 Lux should be sufficient.

### **Ba Compressor Log Book**

This log book should be hard bound and suitable for the recording of all activities relating to the compressor. This is to be completed by any individual after:

- Carrying out any cylinder charging.
- Carrying out any air sampling or filter change.
- Servicing the compressor.

The log book should be provided with dedicated storage, where it can be easily located.

### **Inventory**

An inventory of the BA charging facility in set out in appendix 'B'  $\,$ 

### Standards for BA Servicing Facilities

The following is to be the considered as the minimum standard that is expected to be provided for BA servicing facilities. This standard is intended to apply to all fire stations and training establishments.

Where it is reasonably practicable this provision should be separated from all other areas. Where the following standards do not exist at present then the service estates support function is expected to progressively move to this standard.

As far as is reasonably practicable this standard is to be considered as the generic minimum provision that should be provided:

- Double stainless steel sinks provided with hot and cold water.
- Where practicable an aqua jet wash facility is to be provided.
- Stainless steel worktop (or other suitable surface) to enable at least 2 BA sets to be simultaneously serviced. In some training establishments, due to the nature of the training taking place a larger servicing area may be necessary.
- A minimum storage facility to enable the storage of cleaning materials and other substances for the BA sets.
- Suitable lighting that will prevent strong shadows within the service area. This should be at least 500 Lux.
- All surfaces should be capable of being kept clean and maintained in a clean condition.
- Nothing is to be stored within the servicing area that does not directly relate to the maintenance or use of BA. The only permitted liquids and other materials are those that relate directly relate to the function of servicing breathing apparatus.
- Suitable storage may be provided for BA cylinders that have been delivered to or are being collected from the station or training provision.
- Adequate heating is to be provided that will support the drying of the working surfaces etc.

### **Appendix A**

### Cleaning Routine for BA Compressors and Charging Rooms

Both the compressor and charging rooms are to be:

- Kept free from dirt and dust by cleaning the area after use and at least weekly.
- Kept free from unnecessary storage.

The compressor is to be:

- Kept clean as practicable and free from accumulated dirt and dust.
- Free from oil leaks and contamination.

### **Appendix B**

# BA Compressor Inventory

This BA compressor/servicing room should contain the following:

- Compressor.
- Charging manifolds.
- Four sets of Safety Goggles with associated safety signs both internally and externally mounted to the room.
- Four pairs of hearing protectors with associated safety signs both internally and externally mounted to the room.
- Pictorial Compressor chart with Safety Rules (do's and don'ts).
- BA Compressor log book.
- Compressor and associated equipment.
- Cylinder charging racks.
- Safety Signs that include 'No Smoking' safety signs positioned externally to the compressor/charging room.
- Emergency isolation switch (suitably indicated) should be positioned on the compressor itself or in the immediate vicinity of it and also external to the charging room itself.

All emergency stop signs and isolation switches should be suitably indicated.

The Do's and Don'ts list:

- Do only use this compressor if you are competent to do so.
- Do remember that this system operates on high pressures and injuries could occur if used inappropriately.
- Do carry out a visual inspection of the charging panels and hoses prior to starting the compressor and report any defects to Fire Control.
- Do use personal protective equipment Safety Goggles and Hearing defenders supplied.
- Do enter all required details in compressor log book.
- Do, where applicable, stow charge hoses in their respective holders after use.
- Do carry out weekly checks in accordance with Station Weekly Routines and ensure that they are recorded.
- Do make yourself aware of the emergency stop button locations.
- Do not remain in charging room unnecessarily, whilst the compressor is running, without the above PPE being worn.
- Do not operate compressor if defects are noticeable.
- Do not distort charge hoses by incorrect attachment to cylinders.

# **Compressor Room Layout Guide**

The following information is designed to assist stations/premises in ensuring that compressor rooms and associated areas conform to the standard layout for compressor rooms within DSFRS.

lan Bartlett is Station Manager – Fire Behaviour School at Devon and Somerset Fire and Rescue Service

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Cover image, courtesy of W.S. Darley & Co., displays the aerial capabilities of the new Darley Stinger drone.

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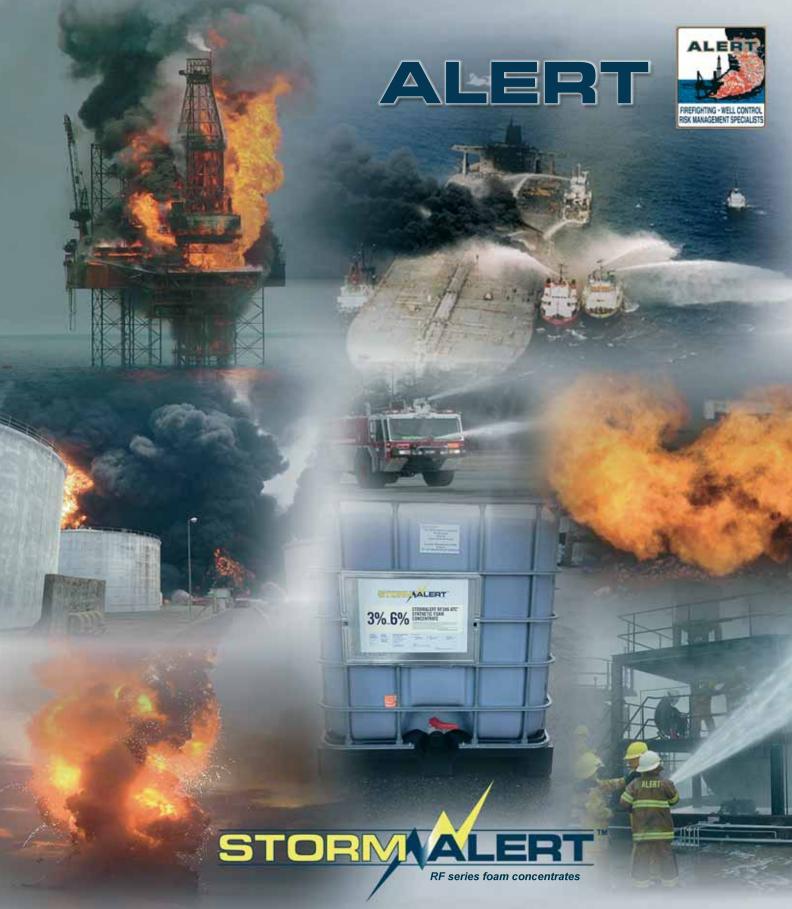
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**Duncan J. White** 

Duncan is the current Chair of the UK Chief Fire Officers Association (CFOA) Event Safety Group and a Station Manager with Devon and Somerset Fire and Rescue Service, based in Somerset. The views expressed here are his own and not necessarily shared by the organisations he represents.

# Public Safety – is it a shared responsibility?

It appears that we are living in a society where the focus on safety has never been more prevalent. Safety seems to be taking over our daily lives with warnings signs displayed on almost anything we use and advice and guidance given on everything we do. Have we become totally focussed on safety for fear of litigation or have we just learnt lessons from historical tragedies?

ealth and safety at work is nothing new having been with us for over 100 years. Dr Mike Esbester, an historian from the University of Plymouth, recently discovered an illustrated magazine which was published in August 1913 and attempted to inform Great Western Railway employees of the dangers they faced at work. It would appear that this has paved the way for today's health and safety laws and the cautious society we now live in.

Firefighter Safety, Crowd Safety, Public Safety, Community Safety etc. are frequently used terms that we have all become familiar with but do we really understand what they mean?

Have we just adopted phrases that give the impression we are doing the right thing or when we scratch the surface do we actually uncover a culture where safety comes as second nature?

'Elf and Safety is frequently ridiculed in the media and blamed for creating an environment where we are prevented from doing the things we have always enjoyed and that we are depriving the next generation of these experiences. Although it is amazing how quickly this ridicule is replaced with anger and outrage when someone is injured or killed because of failure to adopt an appropriate safety system.

Health and Safety must not be limited to the workplace or undertaken just because there is a legislative requirement – we must all undertake to share the responsibility to create and maintain a safe environment in which to live.

'Life Safety' is a term I first came across being used by the National Fire Protection Association (NFPA) and one that I believe we should adopt to embrace our shared responsibility to safety, regardless of whether we are at work or not. Life Safety is a community responsibility and needs to form part of our community cohesion – we need the public to understand our statutory duty and look to engage with and encourage them to adopt a life safety culture for their communities.

Event safety management is an area that I am involved with and regularly find myself being asked to give advice and guidance in relation to public safety at large and small scale events.

Public expectation is vitally important and something that we should be mindful of in everything we undertake. When creating and maintaining a safe environment this is something that we mustn't lose sight of and we must ensure that the fire and rescue service, as a 'Responsible

Authority', continue to work with our multi-agency partners to ensure that life safety is maintained at a level that is deemed appropriate for the activities being undertaken. We do not need to look too far to identify a way in which this can be achieved using a framework that is almost 40 years old.

In these times of austerity we should all acknowledge the need to 'deliver more with less' but this must not allow us to lose sight of the importance of life safety.

This was brought sharply back into focus recently with the High Court ruling that the original inquest verdict of accidental death, following the 1989 Hillsborough Football Stadium tragedy in Sheffield, UK was to be quashed and a new inquest held. This will most definitely focus the spotlight on the way in which responsible authorities engaged in relation to life safety and will have an enormous impact on the way in which we undertake this role in the future.

Safety Advisory Groups (SAG's) are nothing new with the framework for them coming from the 1975 Safety at Sports Grounds Act. This framework was further strengthened following the input from Taylor's report into Hillsborough, although we find ourselves almost 25 years on and SAG's are still not mandatory and are seen by many as a 'nice to do' rather than a 'must do'. The use of SAG's should not be limited to sporting venues or large scale events but should be integrated into our communities and used as a method of community engagement and a conduit to provide advice and guidance on a whole range of safety related issues.

I regularly hear of instances where authorities are choosing not to resource activities where they have no statutory responsibility as a way of reducing financial burden. This approach is interesting and one that I would consider to be a risk to any organisation unless a thorough risk based process has been undertaken which must take into consideration public expectation and life safety. I find it difficult to understand that if you know something is a risk how you can justify doing nothing to manage it. If you were called to give evidence to an enquiry would you be satisfied that you could demonstrate that you showed 'due diligence' and that your response was 'suitable and sufficient'?

For the emergency services, responsible authorities and the community, life safety must be the number one priority not because it is something we have to do but because we know it is the right thing to do.

### www.mdmpublishing.com

### Maximise Efficiency: Visit the Emergency Services Show

The free-to-attend EMERGENCY SERVICES SHOW provides an invaluable opportunity for fire and rescue services to maximise efficiencies through collaborating with industry colleagues, other blue light services, voluntary organisations, government departments and third party suppliers. Taking place at the NEC on 25 and 26 September, it is open to all ranks throughout the fire and rescue service and industrial brigades such as refineries, airports and MOD, as well as fire prevention officers throughout industry. Register now at www.emergencyuk.com/iffp

Visitors to the show can meet with voluntary organisations and charities who provide valuable support to fire and rescue crews and find out about training courses that meets the changing demands of today's fire fighters. Other Fire and Rescue Services will be exhibiting to share best

practice on the efficient planning and sharing of resources and the likes of RNLI, Maritime & Coast Guard Agency, Cave and Mountain Rescue, RAF Search and Rescue, Association of Lowland Search and Rescue, and Mountain Bike Search and Rescue can be found in the dedicated Search and Rescue Zone.

With over 350 suppliers, the exhibition provides a single reference point for procurement personnel to access to the full range of products available from fire fighting equipment and vehicles and fleet to protective clothing, uniforms and medical supplies. Adding to the experience, some of the kit can be seen in action. The Road Haulage Association is organising a Recovery Demonstration that will highlight the latest equipment can achieve in the correct hands with the right training. Derbyshire Fire and Rescue Service and CFOA National Resilience will

be showcasing The Ex-Tractor, an HGV "transformer" designed to demonstrate the nationally-adopted six phase HGV rescue approach. SARbot UK Underwater Rescue, Norfolk Fire & Rescue, and West Midlands FRS and will be running exciting demonstrations of water rescue in the Pendigo Lake at the NEC and Thermal imaging demonstrations will be provided by Argus Thermal Imaging (distributed by Vimpex)

Entry for either or both Show days is free of charge for all visitors, as is parking. Online registration is now live at www.emergencyuk.com/iffp



### The Doty Belt



The DOTY BELT/LIFT ASSIST HARNESS has been created to ensure the safety of patient and rescuer, while preserving patient dignity and well-being. The ergonomic advantage the 'Doty Belt' provides for lifting and manoeuvring heavy, elderly and bariatric patients reduces the risk of back injury for providers and increases security for patients.

The 'Doty Belt' stitching has been pull-tested up to 1,500 lbs without tearing or wear to the handles. Whether it is moving an elderly person, a particularly heavy person, or picking up people that are in a difficult situation, this tool gives first responders the ability to lift and assist a person in a safe, manageable and efficient way.

The Doty Belt/Lift Assist Harness was developed by Glen Doty, a fire captain with 20 years of service, who recognised the growing need for an effective, safe way to lift and manoeuvre patients that would also be compact, reliable and reusable.

For more information, go to www.dotybelt.com

### DQE introduces the Decon Stability Cane

Wearing a bulky HazMat suit during responder decontamination makes it difficult to manoeuvre, leading to slips and falls. After watching emergency responders resort to using walkers, traffic cones and other objects not designed for their specific needs during decontamination, DQE has developed the Decon Stability Cane to assist Emergency Responders during Decontamination. First responders can now move with ease, grasping the security of the Decon Stability Cane.

The Decon Stability Cane is an exclusive DQE product that is made of sturdy, high-density, industrial-grade PVC designed to withstand years of use in the field. The T-shaped handle is the ideal size for a responder's gloved hand and the handle's bright orange colour increases visibility among other decontamination apparatus. The four legs

have skid resistant rubber feet that resist slipping in wet environments, such as a decontamination grid. The cane is especially helpful to lean on when washing lower extremities and the soles of boots. Having a Decon Stability Cane for support will assist responders with completing the decontamination process more quickly and thoroughly.

For more information, go to www.dqeready.com/DeconCane



### PBI - A Global Force In Firefighter Protection

This year marks 30 years since PBI first opened its doors in Charlotte, North Carolina to create a legacy of high performing protective fabric solutions that has become recognised all over the world.

BI fabrics are renowned for their unique combination of flame resistance, durability and comfort, which is why they are first choice in protection for the most extreme conditions, from NASA astronauts, to emergency responders, the military and formula one driver's.

Today, PBI is a global force in personal protection and is a recognised marked leader in USA, Europe, Asia, the Middle East and Australasia.

Visitors to this year's A+A Exhibition in Dusseldorf will have the chance to see PBI's latest protective fabrics up close. PBI Max is one of the newest products in the company's range of high performance protective fabrics, complementing the internationally renowned PBI Matrix and PBI Gold fabrics. PBI Max offers firefighters the excellent combination of thermal protection that will not break open and high levels of comfort, flexibility, and durability. PBI Max is available in the traditional gold colour or black, with excellent colourfastness and UV performance It's just one of a number of new and innovative products that PBI will have available for visitors to examine at A+A.

The outer fabric is the first line of defence in any protective clothing ensemble and has to be strong and durable to cope with the impacts and abrasions that come with the job. It doesn't matter how well a fabric protects the wearer if it won't hold up to the working environment. PBI fabrics are very durable with high tear and UV resistance. Many customers who have chosen PBI fabrics have noted that structural PPE remains in better condition and requires less maintenance than previous ensembles, potentially extending the lifetime of PPE without compromising on protection. Of course, high durability also means low maintenance.

PBI Gold was the first fabric developed by the company that was specifically designed to protect firefighters and was instantly recognisable due to its distinctive golden colour.

For many years, fire and rescue services in Europe would not consider a beige or gold colored garment as they thought the suits were too American, or looked to similar to the fabric used in potato sacks because they didn't conform to the standard dark blue. But that perception has now changed with many brigades wearing PBI Matrix or PBI Gold and benefiting from a much improved level of performance and protection.

Today, PBI fabrics are also available in navy blue or black, offering a wider choice to fire services. However, it's worth noting that lighter colored outer fabrics make firefighters more visible, especially at dusk and dawn. In the summer a lighter colored garment will absorb less warmth,



helping to manage heat stress. With a lighter colored fabric it's easier to see any dirt and contamination on the garment, so these types of suits are generally cleaner than those that are dark and do not show up contamination as effectively.

It's important not to confuse protection with colour. The colour of the fabric doesn't provide the protection — it's the physical make up and the natural flame resistance of PBI fibres that achieves such high levels of performance.

PBI maintains its golden natural colour over the lifetime of the garment and doesn't fade or lose the colour, something you may experience with some other dyed products. Firefighters should always check the label inside their garment for reassurance that they are wearing PBI protective fabric.

PBI's expertise is not limited to outershell fabrics. PBI Baseguard has been specifically engineered to be worn as a base layer. It is incredibly light and soft, creating garments that are cooler, drier and absorb perspiration better than any other knit fabrics on the market. The fabric wicks eight times more sweat from the body than cotton. Garments made with the fabric will not shrink or alter their shape with wear, unlike other more conventional next to skin clothing.

Helmut Zepf, Vice President of International Sales and Marketing, PBI Performance Products said: "In the last 30 years PBI has become known for protection in extreme environments because our customers recognise the truly high performance standards that our products achieve. We have always let the products speak for themselves and we give customers the chance to visit independent tests of our fabrics so that they can see an impartial comparison of the combination of protection, durability and comfort that make PBI fabrics unique."

For more information, go to www.pbiproducts.com











### Delta Fire Win New Venezuelan Contract

Norfolk based DELTA FIRE have now completed the production of two bespoke foam skids designed to protect a fuel storage facility in Venezuela on the northern coast of South America.

Delta Fire is recognised the world over for their ability to manufacture high-tech Foam Protection Packages to individual customer specifications from design, schematics and manufacture to testing, installation and commissioning providing a single-source solution to a wide range of Industries around the world.

The remit for this latest Venezuelan project was to provide bund and fuel storage tank protection as efficiently and cost-effectively as possible.

Delta's Technical Team benefit from an accumulation of many years industry experience in this field and were able to design two fully integrated Foam Skids to achieve their customer's very specific directive, all in accordance with NFPA11 requirements.

The completed System consists of a four point fire protection design with both foam bund protection and tank protection backed up by a comprehensive coverage by 10 Stainless Steel Fire Monitors fitted with Bronze Nozzles providing on-site water cooling. A further package of Hose Cabinets equipped with Delta's Nova Type 3 Fire Hose and Attack 500 Fire Nozzles completes the package.

The first foam skid was designed and manufactured to provide protection to the fuel bund (a walled or banked area containing fuel storage tanks) in the provision of low expansion foam preventing the spread of fire from one tank to another whereas the second skid provides foam to the top of the fuel tanks via a series of Delta Top Pourers. These Top Pourers provide flammable liquid storage protection by a pre-set flow of foam onto the tank shell gradually cooling and pouring gently onto the fuel surface.

Delta Fire has become a leading force in this specialist area of Fire Protection and is at the forefront of design and development of custom-built foam systems. Recent projects have included the provision of specialist systems for International Naval Fleets, Off-Shore Platforms, Heli-decks, Major Airports and Petrochemical Plants.

Delta Fire's client base testifies to their excellent reputation in this field with major global companies recruiting their services such as BAE Systems, Shell, BP, Total,



Conoco-Phillips, AMEC, Bechtel, Reliance, ADNOC (Abu Dhabi National Oil Company) to name just a few.

Working closely with numerous Defence markets at home and abroad Delta Fire are proud to be suppliers of firefighting equipment to the Royal Navy providing hi-performance, dependable systems that will withstand the most difficult of working environments.

Delta Fire have seen demand for their

products and services increase dramatically over the last few years and have been very pro-active in ensuring that their infrastructure grows equivalently ensuring that their high level of service and product quality is retained at all times.

Investing over £1m this year on a second new CNC production site Delta Fire boasts what is probably the most advanced fire product manufacturing facility in the UK with the ability to design and build large scale foam systems under

one roof.

A full size on-site Test Cell allows Delta to provide full scale equipment tests to their clients prior to delivery. Final testing is regularly carried out in-house with Lloyds inspectors present for approval in the presence of the client ensuring total customer satisfaction.

For more information, go to www.deltafire.co.uk

### LUKAS P 630 SG – Mobile Turbo Power

With the P630 SG LUKAS introduces a new mobile power unit for simultaneous operation of two hydraulic rescue tools. It combines light weight and maximum power in a unique way and also features the turbo function to speed up rescues considerably, making it a valuable assistance for all rescuers who need to change locations guickly.

The new power unit with convenient size and light weight suits perfectly for rescue work at traffic accidents, operations in rough terrain or hard-to-reach places, USAR and disaster response operations.

The turbo function doubles opening and closing speeds. This is very



helpful if tools with a high oil volume such as telescopic rescue rams need to be used. Thanks to the sophisticated design of the new oil tank, filling and usable quantity are almost the same. The standard oil filling is 2.2 litres. If required it can be topped up to the maximum oil quantity of 3 litres. The oil level can be checked visually through a slot in the side panel. With the practical carry frame the power unit is perfectly all-round protected.

For more information, go to www.rescue.lukas.com

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# New Training Facility For Devon & Somerset Fire & Rescue Service Training Academy



Zero harm is a mantle which, quite naturally Devon & Somerset Fire & Rescue Service (DSFRS) takes very seriously. Trying to ensure zero harm to the firefighter is something that we all work hard to achieve.

ne of the ways to do this is to make sure that quality training is provided in a safe, controlled environment while also ensuring it is realistic and worthwhile. DSFRS pride themselves in delivering excellent training to their staff. We have, for a little while now, also had a trading arm (Red One Ltd) which delivers the same quality training to the customer.

Recently we have upgraded our training facilities by spending £3.6 million building a new facility at our Exeter Airport site. This will enhance the training for our own staff as well as providing opportunities for delivering courses to paying customers. Those of you who have been to Devon for a Compartment Fire Behaviour Training Instructor (CFBTI) or Possitive Pressure Ventilation Instructor (PPVI) course will remember the cabins that have until now served us well at the airport site as the class rooms and dining facilities etc.

Now we can boast a brand new building and training facility. The state of the art building houses everything that you would expect a modern training establishment would house – lecture rooms, an incident command suite, dining rooms, changing and showering rooms, drying rooms, Breathing Apparatus (BA) servicing areas, offices and storage areas etc. In addition to the building we have a new 3 storey hot villa, a large concrete training pad with various diverter valves for different classes of foam training, a cold villa complex, attack containers and fire behaviour demo containers.

Work started approximately 12 months ago. The BA training centre was moved onto a temporary site which was still at the airport and continued to operate throughout the whole build. While it was a difficult time for the staff based here, enduring the months of mud, dust and

### TRAINING PROFILE



noise, it is finally worth it. Phase one is complete and we are able to move in. Additional training and administration staff have also been able to move from other areas of the Service to make use of the new facilities and free up crowded office space elsewhere.

This was a great opportunity for us to have a building that was designed just for this purpose and not having to make do with an existing one or one that was built many years ago and doesn't really suit the modern Fire Service needs. There was considerable thought given to our carbon footprint and the build has been able to incorporate photovoltaic cells (approximately 18 kw) for water heating, air source heat pumps, rainwater harvesting, lighting controls and brise soleil (sun shading).

Opportunity to design didn't stop at the main building. We worked with a supplier to design a new hot villa. The result is a much more versatile building. It is built over three floors and has a rising main. The protected stairwell at one end can be used to simulate high rise incidents. We have 14 positions to burn crib fires spread over all three levels. There are two stair cases and each level has access to fresh air virtually all round. The building is fitted with extraction and temperature monitoring is throughout. The new villa provides us with a number of options to have realistic live fire training ranging from domestic property to industrial and high rise.

Our relationship with our Airport Fire Service counterparts has meant that we have included a large (5525 sq m) training slab which in the near future will have an aircraft fire simulator and we are looking into the possibility of a similar helicopter version. Like many other Services we have struggled to find ways to practice and train with foam. We are now able to contain the foam and with the use of diverter valves can keep different classes separate so that we can safely dispose of the waste product when the training is over.

Head of Training, Area Manager Wayne Bowcock said, "The opening of our new offices, lecture rooms and training facilities at Exeter Airport is a significant investment for Devon and Somerset Fire and Rescue Service. We have always been committed to excellent quality Breathing Apparatus training which has resulted in a very high degree of technical competence amongst our instructional staff. Their design and development of the practical training facilities builds on years of knowledge and 'field testing' which is already demonstrating

great benefits for our own firefighters and customers. Coupled with modern lecture and welfare facilities and the inclusion of Incident Command Training at the same site we now have facilities that truly reflect our passion for firefighter Safety and excellent training.'

The site position is also very favourable for those wanting to get here without too much effort. There is easy access from the M5, A30 and A38. Exeter Airport is a growing regional airport with regular flights to many UK destinations as well as most of Europe. It should

not be out of the question for us to attract international business with a facility and training provision of this calibre. The airport itself is being further enhanced and a new "Skypark" is being built which will provide plenty of hotel accommodation almost on the doorstep. National and international customers will find this very convenient.

Commercial Services Manager Chris Thain added, "As our service adapts to changing demands and reduced budgets, we need to find new ways to ensure that our resources are utilised as effectively as possible. Through our trading company, Red One Limited, we offer highly specialised training, fire and safety cover and consultancy on a commercial basis both to industrial clients and other fire and rescue services. The addition of these fantastic new training facilities at Exeter Airport will further enhance our product offer, helping us to generate important additional income for our service"

We are very pleased to be able to offer the following courses at the airport site:

- CFBTI and CFBTI requalification
- PPVI, PPV stage 1, 2 and 3
- BA initial and requalification (Whole time and RDS)
- BA Instructor
- Incident Command (Supervisory and Middle manager)
- Bespoke BA and ICS courses
- Foam courses (Class A and B)

Looking into the future we hope to be able to offer aviation courses including helicopters as well as fixed wing aircraft and Strategic Level Incident Command courses.

We have a phase two of the building plan and a new appliance bay will soon be started. It is expected to be finished early in 2014. At that time we hope to have a grand opening ceremony. In the meantime we are very pleased to have moved from the cabins into this fantastic new building and are sure that our own staff and our customers will find it also a very pleasant and rewarding learning space.

Come and see us on stand G32 at:

WITHE EMERGENCY
SERVICES SHOW

NEC BIRMINGHAM 25-26 SEPTEMBER 2013

If you would like to know any more about this new facility and the courses it can offer or anything else about the Training Academy and Red One Ltd at Devon & Somerset Fire & Rescue Service, please contact Geoff Hiscocks — ghiscocks@dsfire.gov.uk

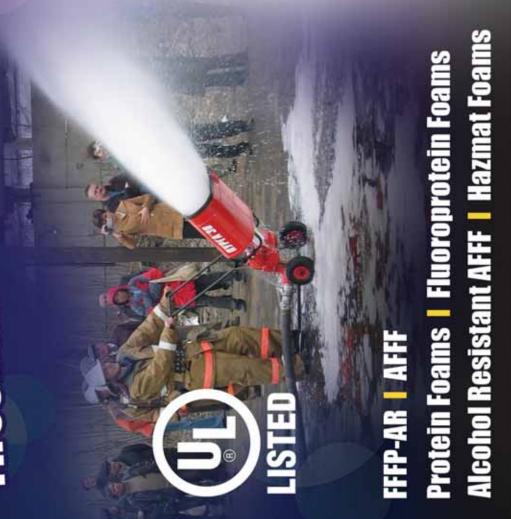


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# Firechem Foams



# FireChem Force



**Norld's Most Powerful Extinguishing Media** Lowest Application Density: 0.40 Kg/m Dry Chemical Powder for High Risk Class B Fires Potassium Bi-Carbonate Urea Reaction ComplexI

# LDH Carrier for the Heroes

On March 11th 2011, Tokyo Electric Power Company's Fukushima Nuclear Power Station was destroyed by the tsunami caused by the Great East Japan Earthquake. Severe damage to the reactor building set off explosions and Fires in Fukushima Daiichi Nuclear Power Units 1-4. In the hours to follow, personnel on site discovered that the spent nuclear fuels had to be urgently cooled. Worse still, leaked radioactive material had pushed the radiation level up to 400mSv, imperiling everyone in and around the reactor site.

he Fire and Disaster Management Agency requested the Tokyo Fire Department to dispatch a Super Pumper and Hyper Rescue Team to cool the spent fuel rods. On the 18th of March, 139 firefighters in 30 teams arrived at Fukushima Daiichi Nuclear Power Station and immediately commenced cooling operations. A 150mm (6") diameter hose had to be extended over an 800m distance from a highcapacity submersible pump dropped from a guay in the station premises to the water-cooling site inside the reactor building.

Yet rubble generated by the explosion and other obstacles made it difficult to extend the hose over the whole distance with a hose-extending vehicle. Team members had to extend the hose by hand for 350m out of the 800m. The hose-

extension operation began at 2330hrs that night. Every 50m span of the 150mm (6") diameter hose weighed over 100kg. The task was grueling over the stretches unaided by machine. The team worked in the face of extreme danger, measuring the levels of radiation, the hidden and unseen enemy, every step of the way. The thirty-two elite firefighters in the front-line emergency unit completed the operation by 0015hrs the following day.

Water was pumped through to begin cooling the spent rods at once. The firefighters had put the worst behind them. This was a team of heroes who saved Japan from what could have become a crisis worse than anything ever before experienced.

Moved to action by the Fukushima catastrophe, the government and Nuclear Regulation Authority ordered all domestic nuclear power stations to take measures against accidents equivalent to the one at Fukushima Daiichi Nuclear Power Station. The order was issued at the beginning of 2013.

In response, the electric power companies who run nuclear power stations have so far ordered, planned, or introduced several tens of high-capacity submersible pump units, more than 50,000 meters of large-diameter hose (100mm (4") to 300mm (12") diameter), and more than 10



large water monitors with discharge capacities exceeding 20,000 litres per minute.

YONE Corporation has been a majo contributor to these projects.

About a year ago, YONE started to develop and produce an LDH Carrier (Large Diameter Hose Carrier) to improve the efficiency of hose extension operations for cooling in scenarios identical to that at the Fukushima Daiichi Nuclear Power Station. Units have already been delivered to nuclear power facilities around the country.

Drawing from the lessons learned at Fukushima, we have designed a lightweight/compact hose carrier that loads easily onto vehicles, is easily and quickly deployable by a single operator without power source required in case of emergency situation and easily stretches over rubble and debris.

The electric power companies who now own the YONE LDH Carrier are forming special teams to deploy the Carrier inside their stations. They are also conducting constant training drills to assure smooth hose extension if and when true emergencies strike.

The LDH Carrier is expected to be widely used for large-hose deployment for fire-fighting operations and other disaster scenarios in the future.

Further more information, go to www.yone-co.co.jp

# FireBug headline at Glastonbury Festival

The Glastonbury Festival creates unique challenges for the emergency services – in particular how they deal with incidents amongst the 177,500 festival goers on the 1000 acre site.

Public safety is always number one priority for Devon and Somerset Fire and Rescue Service (DSFRS) given the size and density of the crowd. The ability to move vehicles safely around the site is always given



the highest consideration and this year to enhance their operation they were assisted using a RescueMax vehicle from the FireBug Company.

Utilising WaterMist technology the FireBug Company and JCB have developed an all-terrain, all-weather, first response fire vehicle capable of dealing with all classes of fires. Built upon the unrivalled JCB 1000D WORKMAX chasis and incorporating the FireBug WaterMist Technology fire system, the RescueMax is able to tackle the full spectrum of fires, offering an effective, comprehensive response vehicle.

Candice Link, Project Manager for FireBug said, 'the operational crews were particularly impressed with the versatility of the RescueMax and the ability it gave them to effectively deal with a whole range of fire scenarios using one compact vehicle.'

For more information, go to www.firebuggroup.com

Crewsaver introduce the Smartfind S20

The latest product to hit the shelves in the MCMURDO RANGE distributed by Crewsaver is the Smartfind S20 SRS (Survival Recovery System) specifically designed as a personal AIS search and rescue locating device to quickly and efficiently locate and retrieve a missing crew member. It is compatible with existing AIS enabled chart plotters and onboard navigation systems providing a reliable and cost effective solution for crew safety.



'The Smartfind S20 is a vital piece of kit for anyone who plans to venture offshore. Small, compact and easy to attach to most life jackets, it's your saving device in an emergency situation.' – Greg O'Brien, Sales and Marketing Manager at Crewsaver.

#### **How Smartfind S20 works**

- S20 is activated in an emergency crew recovery situation.
- An alert message is transmitted to all AIS receivers and AIS enabled chart plotters within a 4 mile radius (typical).
- An AIS SART alert icon marks the survivor's location.
- Precise target survivor information including GPS position becomes viable when the chart plotter cursor is positioned over the icon.
- Provides exact location, distance and bearing to locate person(s) in need of assistance.

For more information, go to www.mcmurdomarine.com





# XPERIENCE

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### Jo Bird & Co Ltd - Ready for anything

Jo Bird manufactures fire safety equipment storage cabinets for use in the world's toughest environments. Here's how it helps you prepare for the worst-case scenario.

ou're in the middle of the Sahara. It's pushing 50 degrees and blowing a sandstorm so fierce the wind could pull the skin from your face. Fire is ripping through the oil refinery it's your crew's job to protect – and if you don't get on top of it in the next few seconds, the nearest help is hundreds of miles away.

When you reach for your kit in conditions like this, you need to know it's going to work. So too do the people whose lives depend on you. And if you can't enter a burning building because your breathing apparatus has been wrecked by years of exposure to the desert environment, their survival is out of your hands – which means that pretty soon, you'll be asked some very difficult questions.

Of course, the above scenario would never happen to any professional outfit, as their kit is checked and tested so often that they'll always be able to rely on it when the time comes.

grown to become a world leader in its field.

The Queen's Award for International Trade specifically recognises achievement in the export field, and Jo Bird's growth here has been little short of phenomenal. From a figure of £733,000 in 2009, the company's annual exports have grown to a staggering £1.77 million – an increase of 141 per cent in just three years. Now, the company is expanding its production facilities in order to keep up with the increased demand for its products.

Like all the best business models, Jo Bird's growth has been led by its products. 'We went out and talked to our customers,' explains Managing Director Guy Atkins, 'among them several major oil and gas companies and contractors. They told us about the increasingly extreme climates in which they are operating, and we set about enhancing our products to meet these new environmental challenges.'

As mankind goes looking ever further afield for its natural resources, it stands to reason that the environments in which they are extracted will become increasingly remote and inhospitable. Jo Bird products are designed to last the distance in the most extreme conditions experienced in the furthest flung corners of the world, where the attrition level suffered by man and machine alike is enormous.

But in the harshest environments on the planet, protecting the equipment that lets you protect others means more than just running the rule over it once a week. Wherever you store it needs to be more than just a box – in extremes of heat, cold, wind and more, it needs to be your first line of defence against nature's non-stop assault on the tools of your trade.

#### **Building success**

That harsh truth is one of the reasons why Somerset's Jo Bird & Co has just been honoured with the Queen's Award for International Trade. Founded in 1986, the company specialises in storage for fire safety and lifesaving equipment. From its beginnings as a family business, it has

As mankind goes looking ever further afield for its natural resources, it stands to reason that the environments in which they are extracted will become increasingly remote and inhospitable. Jo Bird products are designed to last the distance in the most extreme conditions experienced in the furthest flung corners of the world, where the attrition level suffered by man and machine alike is enormous.

'Geographers talk about extreme weather events in terms of how frequently they can be expected to occur,' continues Atkins. 'For the Gorgon Gas Project in Australia, for example, we designed cabinets that would withstand a "once in 100 years" cyclone. That meant wind speeds of up to 200mph.'

### **COMPANY PROFILE**

### **Firebird**



When the world-leaders in the petrochemical industry want to protect their firefighting equipment, they look to Jo Bird's Firebird range. Made from heavy-duty GRP, these cabinets offer long-lasting protection against the very worst environmental conditions.

Quality-assured by a raft of third-party certificates, the Firebird range offers a wide variety of user benefits:

- Made exclusively to order
- Can be customised to buyer's specifications
- Weatherproof from –40 to +50°C
- EPDM sealed against ice, water, sand and dust
- Built to withstand wind speeds of more than 200mph
- No-rust fibreglass construction
- Various colours available, all UV-resistant
- High-performance fittings in nylon and stainless steel
- Available with heating, ventilation and insulation

### **Bespoke protection**

The product Jo Bird has developed to take such a battering is its Firebird range of Glass Reinforced Plastic (GRP) cabinets. Supplied to customers of the calibre of BP, Shell, Exxon Mobil, Total, Chevron Texaco and Maersk, these have been tested to temperature ranges from –40 to +50°C and battered with water, ice, sand, dust and wind. Their fibreglass construction means no corrosion, and their fittings are engineered to the highest possible standards to ensure a long, maintenance-free operating life.

Backed up by a raft of independent certifications, the Firebird range is made exclusively to order. Each unit is built to its buyer's own specification – which might mean anything from signwriting the case to altering the internal layout or adding heating, insulation or ventilation.

'We've been making GRP cabinets since the company was founded,' says Atkins, 'and we've

been seeing the effects of long-term exposure on our products ever since. Those 27 years of experience make us experts in our field, and that in turn means we can advise our customers on the best cabinet to suit their needs.'

So, what are the details that make these fire equipment storage cabinets so resistant to the elements? After all, you might think that anyone can make a plastic box to put things in.

For Jo Bird, though, quality is something you build in at every level. The cabinets are made from GRP with a minimum thickness of 3mm up to a robust 55mm, reinforced at mounting points and equipped with catches, hinges and other fittings that meet the same exacting standards as the cabinet to which they're attached.

A standard extinguisher cabinet for example, will come with 316 stainless steel fittings and a seal made from EPDM, a synthetic rubber known for its outstanding thermal insulation properties and resistance to ozone and weather attack. Where used, roller shutters are specified to extreme-environment standards.

Each cabinet is designed with its unique purpose in mind, adjusted to suit the demands of its environment, and rigorously tested to ensure the rapid access and removal of the equipment it carries.

Backed up by a raft of independent certifications, the Firebird range is made exclusively to order. Each unit is built to its buyer's own specification – which might mean anything from signwriting the case to altering the internal layout or adding heating, insulation or ventilation.

The third-party accreditations mentioned above include Lloyd's Register and IP56 Type Test product approvals. The Company as a whole is Quality Assured to BS EN ISO 9001:2008, and to BS EN ISO 14001:2004 for Environmental Management Systems. There's a lot of peace of mind there to back up Jo Bird's proven track record, whatever product you're shopping for.

### Tough and ready

In less extreme conditions than those in which only the Firebird range will do, Jo Bird's ToughStore cabinets provide a reliable means of safeguarding equipment against the elements. Made from ABS, polycarbonate and polyethylene, they too are durable, strong and resistant to environmental attrition.

ToughStore products are typically used to house fire safety and lifesaving equipment in waterside, marine, industrial and commercial environments. They can be customised with features like tamper seals, adjustable shelves and reverse mounting systems, and many also come with a clear door for instant identification of their contents.

### **ToughStore**



ToughStore cabinets offer a reliable means of safeguarding your fire safety and life-saving equipment. Designed to offer a long-term solution for use in everyday weather conditions, they tick all the boxes for secure storage:

- Made from ABS plastic and polycarbonate
- Strong, durable and resistant to environmental degradation
- Provide effective protection against typical year-round weather conditions
- Made in highly visible, internationally recognised colours
- Fire extinguisher cabinets feature a clear polycarbonate door for easy identification of the contents
- Suitable for a wide variety of industrial, commercial and marine environments
- Useful benefits include tamper seals, adjustable shelves and reverse mounting
- Door alarms available as an optional accessory

As you'd expect from a world-leading manufacturer, Jo Bird builds its ToughStore products to the same exacting standards as the Firebird range. And the company enjoys a genuinely global reach when it comes to selling them, with a network of international distributors giving it a leading presence in key territories across every continent around the world.

### An international reputation

So, what's the secret to achieving such a commanding reach? Simple – for Jo Bird, the quality of its products reflects the quality of its people. There might not be a cast of thousands producing the equipment for which the company is known, but each member of the team is responsible for its success. This is a very popular local employer with a top-notch reputation in the industry and the region alike, and the loyalty shown by its staff illustrates the company's dedication to providing them with rewarding jobs and a high-quality working environment.

'We're proud of our achievements in becoming an internationally recognised brand,' says Guy Atkins. 'I'm particularly proud of the individual contributions made by every member of our team. Without their dedication and commitment to delivering quality products and customer service, our international trade success, as well as our substantial UK business, could not have been achieved.

'The Queen's Award for Enterprise will undoubtedly enhance our international reputation,' he continues, 'and help us to grow our business in existing and new-world markets in the years ahead. That's all down to the team of people who have shared the company's vision every step of the way.'

This isn't something you're likely to be thinking about when fire threatens to engulf the refinery you're guarding and you reach for an extinguisher whose container has just been forced to withstand a hurricane. But if that container had failed in its task, with the extinguisher inside rendered useless by a prolonged battering of salt spray at hundreds of miles an hour, things might well be different.

Safety is always paramount in industrial applications and, though the box in which you keep your fire-fighting equipment might not sound like something out of the James Bond gadget catalogue, it's every bit as crucial to life and limb. With Jo Bird it is every bit as technologically advanced, too.

'These unassuming plastic boxes are called upon in moments of high drama under extreme environmental conditions,' concludes Guy Atkins. 'Firefighters might take their functionality and reliability for granted – but our cabinets play a crucial role in the business of saving lives.'

### Jo Bird at a glance

- Specialising in fire safety cabinets since formation in 1986
- 20 + staff based in Somerset, UK
- Full in-house design and manufacturing facilities – currently in the process of being expanded
- Quality Assured to BS EN ISO 9001:2008, and to BS EN ISO 14001:2004 for Environmental Management Systems
- Lloyd's Register type test approval on many products
- IP56 rating on Firebird range
- International distributors on every continent
- 141 per cent growth in export sales between 2009 and 2012, from £733,000 to £1 77 million
- Queen's Award for Enterprise in International Trade 2013



For more information, go to www.jobird.co.uk

### **Bariatric EvacMat**

For over thirty years now Hospital Aids have been providing evacuation equipment from their Northampton factory and warehouse.

ospital Aids believes that offering a wide range of evacuation options is essential which is why as a Company they are constantly striving to find solutions for people with different needs when it comes down to practicality and comfort if an evacuation becomes necessary.

In the last few years, concerns about the physical size of the UK (and worldwide) population has prompted their moving and handling consultant Alison Hayward to work alongside UK manufacturing company, Speedings Ltd to develop and manufacture the Bariatric Evacuation Mat which is being supplied into health care, ambulance and fire and rescue services.

The mat is designed to assist emergency services personnel or designated moving and handling staff to safely evacuate bariatric patients or people from locations such as private dwellings, hospital wards, public buildings etc in the event of an emergency It is a sliding device that can move smoothly and effortlessly across any surface including rough terrain and then can be used for the vertical evacuation down a flight of stairs.

Supplied in one piece with the foot pocket forming the case when it is rolled up the mat is very simply to use. Four side ladder handles and an extra long top ladder handle means that the evacuees can all remain in a good posture and thus reduce the risk of injury to themselves. The unique design of the mat means that the client can be totally cocooned inside strapped in by colour coded straps and buckles thus avoiding any risk of body movement during the evacuation. Four anchorage points have been added two at the top and two at the bottom to facilitate the emergency services to secure a line through if



350kg the mat can accommodate a person of



For more information, go to www.hospitalaids.co.uk

# Firefighters stage 'limo chop' in Covent Garden

London firefighters recently showcased the vital rescue skills used at the scene of accidents by cutting up a limo in the heart of world-famous Covent Garden. Actors from Casualties Union were 'rescued' from the limousine.

The event highlighted the dangers of illegal limousines operating in the capital. The London Fire Brigade joined forces with the Vehicle and Operator Services Agency (VOSA), Transport for London (TfL) and the Metropolitan Police Service (MPS) in a bid to make people more vigilant when hiring a limousine. LFB's award winning extrication team cut up the limousine with trainers from Babcock.

In March 2012 TfL began working with VOSA and the MPS to increase enforcement against illegal luxury or novelty cars that have become part of the Capital's nightlife, following concerns raised by Traffic Commissioners. Since then, more than 19 operations have been carried out, with



roadside checks carried out on 358 vehicles, of which 27 were seized and 232 given prohibitions, banning them from the public road.

London Fire Commissioner, Ron Dobson,

'Our crews are called to around ten road traffic accidents every day which is why it's vital to have regular opportunities to practise their rescue skills. This demonstration has given them a fantastic opportunity to

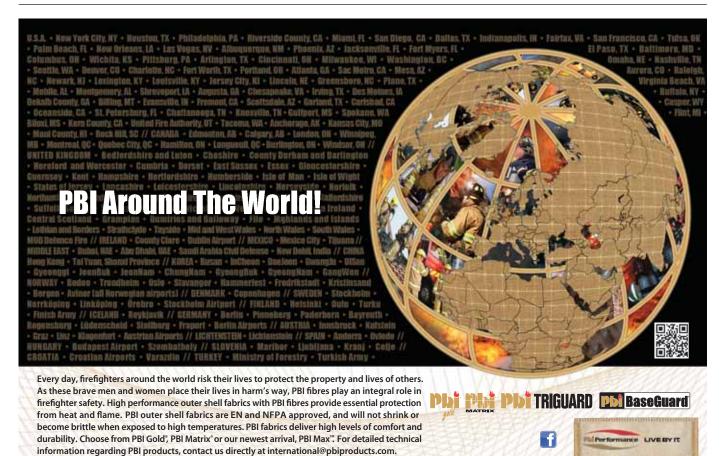
practise these life-saving skills in one of London's most iconic spots.

Londoners, tourists, and shoppers had front row seats to this unique spectacle, as our crews used hydraulic equipment to cut up the limo and rescue people from inside it.

The demo was a great opportunity for the public to see our skills in action, and hopefully it will make them think twice about hiring an illegal limo.'

The limousine was provided by VOSA, and was taken off the streets for failing to meet required safety standards.
Heather Cruickshank, VOSA's Operations Director said:

'The majority of limousine operators are licensed and use their vehicles responsibly, but there is a sizeable minority that does not operate in this way – and the public must be alert to this risk. Only booking with licensed operators is the best way of minimising the risks to themselves and other road users – and helps send a clear message to those who chose to try and trade unlawfully.'



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INTERNATIONAL FIRE FIGHTER 21

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### Packexe Sharpswrap

Packexe Ltd is a UK based company with global operations. Its products are exported worldwide.

ounded in 1989 by the present CEO, Andrew Orchard, the company's success is based on constant product innovation, both responding to and creating market opportunities.

The idea for Packexe Sharpswrap was conceived in April 2011 whilst Andrew was watching teams compete in the North American Vehicle Rescue Association (NAVRA) extrication competition. Teams were using a product already on the market where that they had to cut off adhesive sheets and wrap them around the post to protect the sharps hazard. In approximately 30 degrees of heat as the fire crew continued to work the product began to unravel – it appeared that adhesive was not stable in the heat. Within two minutes a firefighter had to reapply the film and spend time readjusting it on the post.

Andrew commented; 'As I watched, it reminded me of a similar scenario I had seen previously where a firefighter had to reapply a 'B' post cover three or four times during an extrication because the velcro fastening on the cover did not seem to adequately hold it in place.'

With the extensive knowledge gained by Packexe as the major manufacturer of Handy Wrap worldwide it soon became apparent that using the dispensing system and handle, owned by the company since 1992, in association with the right adhesive and the right thickness of film that a solution could be found to assist first responders. It was just a case of formulating the right application method.

The new product known as Packexe Sharpswrap was produced and tested on cars used at the Australasian Challenge, World Rescue Challenges and the TERC Challenge at Myrtle Beach.

Tests showed that the thickness of the material correct and that the adhesive was sufficinet to stop the film from being affected by the heat. The final part of the process was to create a unique colour which would produce a semi-luminous effect as well as branding it for quality reassurance. The product was completed and went live in April 2013 at the Fire Department Instructors Conference (FDIC) in Indianapolis.

### PACKEXE SHARPSWRAP is designed to:

protect rescuers and casualties from sharp points and edges





- be used during vehicle extrication and other rescue situations
- be quick and easy to apply
- be a heavy duty self-adhesive film with lightweight dispenser
- deliver over 50 uses from 1 roll of film

Packexe Sharpswrap consists of a roll of high-visibility yellow self-adhesive film, 100mm wide  $\times$  30m long, and a lightweight re-usable dispenser handle. The rescuer can apply it quickly to potentially hazardous sharp points and edges, making them safe and visible in seconds.

It is important to remember it is a sharps wrap and not a sharps cover – designed to use a small section of the adhesive film applied to the vehicle which is then wrapped around the sharp and then the film is crumpled over the sharp.

Packexe Sharpswrap was successfully field tested by rescue teams from all over the world at last year's World Rescue Challenge. In April 2013 at the FDIC in Indianapolis, USA firefighters welcomed it with great enthusiasm.

In July 2013 'Packexe' held a demonstration day for the Isle of Wight Fire and Rescue Service (IWFRS) at the Ryde training centre. Following the event Chief Fire Officer Steve Apter commented;

Road Traffic Collisions continue to be the highest risk issue faced by operational crews on the Isle of Wight. We have invested heavily in our training and response capability to these incidents including the implementation of enhanced trauma standards, improved response standards based on better risk profiling and on rescue equipment to deal with the ever more complex extrication skills and vehicle design.

Through our continued involvement with the United Kingdom Rescue Organisation annual rescue challenge, our operational crews are continuously learning new techniques and skills and are keen to share good practise to help the IWFRS continually improve. One such product my crews have been keen to try is Packexe SMASH. The feedback from those operational firefighters has been extremely supportive and helps us to further enhance our response at RTC's principally through improving the health and safety challenges to my crews, other responding agencies and casualties we rescue.

We recognise that Packexe SMASH offers a rapid and effective solution when appropriate and is a welcome addition to the toolkit available to firefighters.'

For more information, go to www.packexe.co.uk/ sharpswrap

### Scott Safety recognised with British Safety Council Award

SCOTT SAFETY, world leader in the design, manufacture and supply of gas detection, respiratory and other personal protective equipment, has been recognised for its proven commitment to workplace health and safety by winning the coveted British Safety Council International Safety Award.

Andrew Callen HSE Advisor at Scott Safety comments: "We are absolutely thrilled to have won an International Safety Award. As a company committed to providing health and safety solutions for our customers, it is only fitting that we demonstrate the same standards in our own working environment. Our focus on the wellbeing of our employees is paramount, and this award is testament to the dedication to safety that lies at the heart of our methods."

The British Safety Council International Safety Awards, now in its fifty-fifth year, is open to organisations of all sizes across all industries and seeks to promote high standards of health and safety management practice in order to prevent

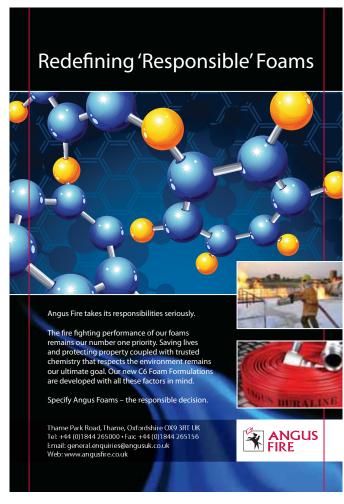


workplace injury and ill health. To win an award a company must demonstrate to the judges their commitment and determination to prevent workplace injuries and work-related ill health.

To emphasise the company's commitment to world class health and safety credentials and a 'zero harm' culture for its own workforce and the environment, Scott Safety has also achieved OHSAS 18001 accreditation. In addition, Scott Safety has also been awarded the Carbon Trust Standard Accreditation, which recognises organisations that actively manage, document and reduce their carbon footprint.

Scott Safety products include the Spirit Powered Air Respirator the Protégé ZM Single Gas Monitor that is easy to use and delivers high performance in a small, ergonomically designed package, and the popular First Base 3 bump cap range.

For more information, go to www.scottsafety.com







### SERVICES SHOW

NEC | BIRMINGHAM | 25-26 SEPTEMBER 2013

Let's get together at **The Emergency Services Show** and see how the **Fire and Rescue Service** can work closely with the other agencies to create the perfect life saving team. Register for FREE entry at **www.emergencyuk.com/iff8** 

# Working together

The Emergency Services Show provides an invaluable opportunity for fire and rescue services to **collaborate** with industry colleagues, other blue light services, voluntary organisations, government departments and third party suppliers.

It is **free-to-attend** for all ranks throughout the fire and rescue service and industrial brigades such as refineries, airports and MOD, as well as fire prevention officers throughout industry.

The Emergency Services Show gives you access to the **most** respected training providers in the industry. The Road Haulage Association is once again organising the popular Recovery Demonstration and Derbyshire Fire and Rescue Service will be showcasing The Ex-Tractor. You can view thermal imaging demonstrations provided by Argus Thermal Imaging, distributed by Vimpex. You will also be able to see exciting demonstrations of water rescue in the Pendigo Lake.

Visit **www.emergencyuk.com/iff8** and register for FREE entry to the Show.



**NEW VENUE NEW DATES** 

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### **Darley Stinger**

Since 1908, Darley has been dedicated to serving the World's Fire and Emergency Services. Darley has a current customer base of more than 125,000, which includes federal, state and local governments as well as customers in over 100 countries. We remain a family owned and operated business committed to customer service and our employees.



ur entire company is committed to customer satisfaction. We are dedicated to excellence and offer a diverse line of quality products and services through progressive design, manufacturing and distribution. Darley was recently awarded major contracts by the Department of Defense to provide our forces with fire fighting, rescue and special operational equipment.

A new edition to this diverse line of equipment is the Darley Stinger. The Stinger allows first responders the ability to quickly and effectively get an eye in the sky. While the Stinger and other UAV technology continues to advance, the capability to provide live stream data to enhance end user situational awareness is growing in importance. With an unmanned eye in the sky within the matter of seconds, the Stinger enables the ability to get closer to an incident without putting a responder in harms way.

Quickly deployable as within seconds and with the opportunity to attach multiple payloads ranging from grams to greater than 5 pounds allow for innumerable applications. In a fire setting, the ability to monitor hot spots and maintain situational awareness of the firefighters can be essential for successful mission operation. In large-scale incidents, an aerial live stream video provides life saving information about post disaster stricken areas. Along with the live stream video, the ability to record the mission can provide valuable knowledge for future training for incident debriefing.

March of this year, New Zealand Fire Service purchased a Darley Stinger. The NZFS Stinger was commissioned in Christchurch, the South Island city whose central business district was devastated by an earthquake and is now under major construction. The unit is equipped with an HD camera as well as a thermal imaging camera.

W. S. Darley & Co.'s involvement in the Fire Industry spans over a century and three generations of Darleys. They not only have a rock solid reputation for building quality products, but also for building strong relationships with Fire Fighting Organizations around the world. Darley draws their strength from being a financially stable company with a unique industry position.

Darley builds Fire Trucks, manufactures Fire Pumps and sells Fire Fighting, Emergency, and Defense Equipment through its catalog and websites. Nowhere else will you find a company as dedicated to the Fire Industry. All this experience comes from a company that cares – W. S. Darley & Co. is customer driven.



For more information, go to www.darleystinger.com or email mikemocerino@darley.com

### Low Price, High Performance Thermal Imaging From Flir

Thermal imaging is an essential fire attack tool and those specifying infrared cameras know exactly what is needed in terms of price and performance in compliance with NFPA recommendations. So when a new product is introduced that offers more features for less money, the market instantly takes notice. This is precisely what has happened with the new FLIR K-Series of thermal imaging cameras.

hese new products were introduced in April 2013 and within a month more than 100 units had been sold and this trend has continued unabated. It's proof positive that FLIR has successfully built on the strengths of its detector core technology and developed a series of cameras that ticks all the right boxes in terms of performance and cost efficiency.

FLIR Systems' status as the world leader in portable thermal imaging across a wide range of industrial markets is key to this early success. Not only has the company been able to factor-in camera features developed for harsh industrial environments, it has also been able to take advantage of manufacturing economies. FLIR Systems is therefore in the unique position of being able to offer highly valuable products, at affordable prices, to the widest community.

For many years the FLIR brand has been the preferred choice of many OEMs and systems integrators who require high performance thermal cores to provide clear and reliable thermal imaging. Using this proven technology, the company has developed its new, fire fighting FLIR K-Series. Models can be specified with either a  $240 \times 180$  pixels array or with an industry standard  $320 \times 240$  resolution for those who require the best image clarity. Both models have a bright 4" LCD display, will withstand a drop of two metres onto a concrete floor and are water resistant to IP67.

The object temperature range of the FLIR K-Series cameras is  $-20^{\circ}\text{C}$  to  $+650^{\circ}\text{C}$  and these models will withstand operating temperatures of up to  $260^{\circ}\text{C}$  for up to five minutes. Camera control is via three large buttons on top of the camera that are designed to be easily operated with a gloved hand.

The torch-style grip that characterises these new FLIR models is well proven in the fire fighting market. It is ideal for single handed operation and can therefore be used when the fire fighter is moving. The design provides a clear, crisp image at arms length whilst allowing good situational awareness.

The camera's ability to measure temperature provides the fire fighter with an important sixth-sense. For example, the FLIR K-Series is able to show if a fire is burning behind a wall. A quick



thermal profile of the scene also highlights areas that remain in danger of re-combustion and enables the user to confirm when the fire has been successfully extinguished.

Although primarily designed for fire attack, the FLIR K-Series is also eminently suitable for use in any search and rescue situation. Up to 200 thermal images can be stored in-camera and later used to enhance a post-incident report.

In common with all FLIR portable thermal imaging cameras, every FLIR K-Series model carries a two year product warranty that complements its ten year detector warranty. Also included in the purchase price are a hard transport case, FLIR Tools software, batteries and charger, cables, lanyards and tripod adaptor.

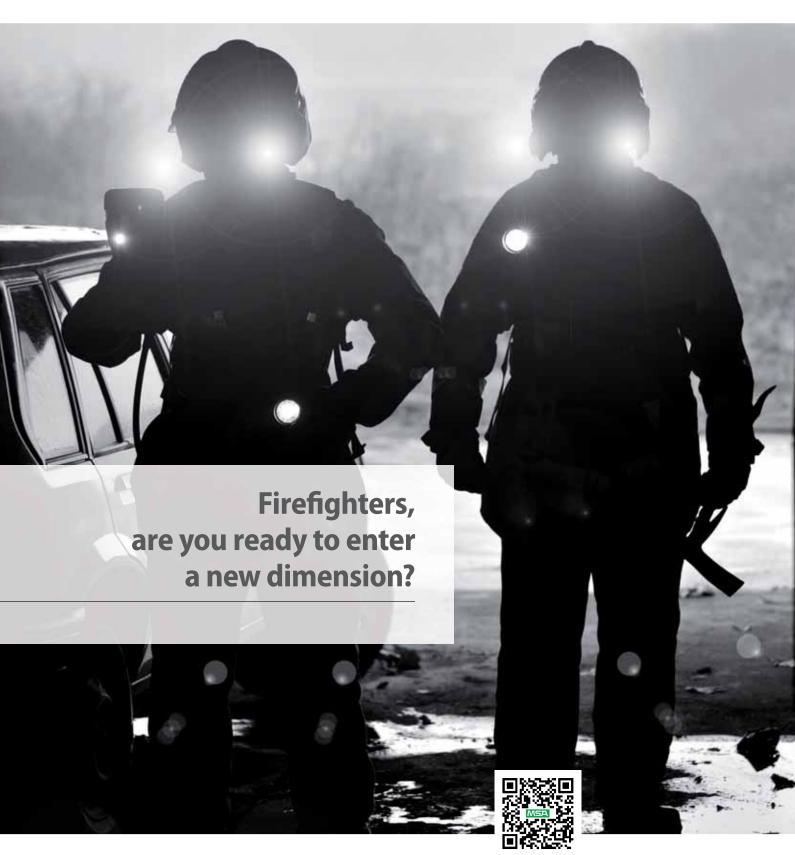
"The FLIR K-Series offers the best value on the market," explained FLIR Business Development Manager, Tonny Hutting, whose experience in fire equipment sales spans 22 years. "Thermal imaging is a mature technology in this industry and buyers know what to expect for their money. The FLIR K-Series has set a new benchmark in this regard and we are seeing the result in volume sales, both in the UK and across Europe."

The FLIR K-Series is available via a network of distributors.

For more information, go to www.newriver.co.uk

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Because every life has a purpose...

### Fativan

atlvan is the world's only fold up door chock. It was originally designed by a firefighter for use by the emergency services. It proves vital for many fields including Fire, Police, EMS, Commercial, Residential, Hotel/Motel and all deliveries. The easy one-handed operation opens quickly for insertion and never slips off hinge, guaranteed.

'Hey, I need more hose up here!' I know I brought enough line onto the porch. Why am I getting stopped short? I put a wood chock under the front door. All should be good, right?

Wrong! That simple wooden wedge you used has slid on the ground allowing the door to close on your hose line. Now all the technology and skill you have as a firefighter is useless because of a little wooden wedge.

### What can you do? Get a Fativan!

A Fatlvan is the answer to one of the most basic firefighting principles which is 'You must keep the front door open and off your hose line.' No matter what the situation, when it's time to attack the fire you have to be able to get the hose line all the way to the seat of the fire.

Fatlvan inventor Nick Caliguri said, 'The above scenario has happened to me more than once in my career as a big city firefighter. I tried everything to keep doors open. All I wanted was a tool that would guarantee the door would stay open and wasn't too bulky in your pocket when not being used. Finally I decided to just make something on my own. This was the seed that grew into the original Fatlvan. When we showed this new tool to the fire and rescue service the response was fantastic! Fatlvan has become an essential tool for many fire and rescue services around the globe.'

So, what is a Fatlvan? The Fatlvan is a compact, sturdy tool consisting of two 'engineered' plastic

L32 LULUIENANI



wings which fold around the enclosed 'case-hard-ened' hook.

When ready to deploy simply unfold the two wings and hang the hook over the inside of a door hinge. Now the door will be open to around 80°. No matter how many times the door gets bumped into it will not shut, guaranteeing the door is open. Simple! I now carry two tools in my pocket and one strapped to my helmet for quick access.

Another great feature is the embedded magnets. Underneath the reflective tape are two magnets. These allow the tool to be magnetized directly to the hinge if for some reason you were unable to hang it over the hinge. It also allows the tool to be stored on any metal surface for quick access. Your Fatlvan will be right at the base of your seat on the fire truck or sticking to a door you happen to use a lot. Fatlvan tools are also used daily by EMS crews.

Following on from the overwhelming success of Fatlvan the same concept and functionality has been applied to the residential and commercial world with the newest tool from NEWCAL – Fatlvan Jr.

Fatlvan Jr. is great for those who don't necessarily need a heat resistant tool but are just in need of assistance holding a door open. Fatlvan Jr. has a design engineered for strength using strong plastics, a zinc plated case hardened hook with a magnet embedded in the tool to make it strong and convenient just like it's big brother Fatlvan.

The new Fativan Jr. is perfect for all residential and do-it-yourself jobs as well as for anyone who just needs to go in and out of doors regularly. Fativan Jr. easily slips over a door hinge making sure the door stays open and cannot accidentally close.

Anytime you need a door held open you need a Fatlvan.

For more information, go to www.fativan.com

# FIRA Equipment And Training For Philippines

Experts from the FURNITURE INDUSTRY RESEARCH ASSOCIATION (FIRA) have just completed training representatives from an organisation in the Philippines to carry out flammability testing for furniture.

FIRA's UK product testing facility, based at its headquarters in Stevenage, has been host to Victor Revilleza, Alvin F. Vardeleon and Edward Paul S. Marasigan from Forest Products Research and Development Institute (FPRDI), a research and development agency under the Department of Science and Technology in the Philippines.

Having worked with FIRA previously, FPRDI recently purchased structural and flammability testing equipment from FIRA for a new testing facility on the island of Cebu and an extension to its existing laboratory in Los Banos, Laguna, which will house a new flammability test facility. FIRA are currently working with FPRDI to ensure both the Philippines operations achieve FIRA accredited laboratory status.

In order to carry out flammability testing at a new lab in the Philippines, Victor, Alvin and Edward undertook a comprehensive training programme led by FIRA's testing experts.

Their visit also provided them with an opportunity to inspect the new bespoke testing equipment before it is shipped to the Philippines.

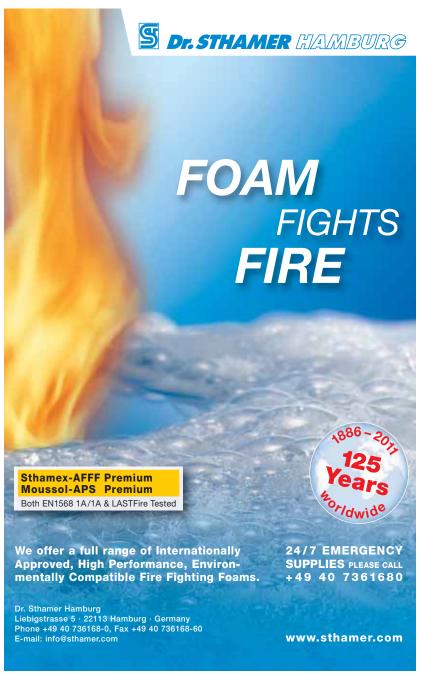
Phil Reynolds, FIRA's Chief Operating Officer, said: "We were really happy to welcome our friends from the Philippines. The flammability training they received covered all aspects of testing, including cigarette and crib tests for all types of different products from seating to foam mattresses for the domestic and contract markets. We look forward to working with them in the future."

Victor Revilleza, FFTC Technical Manager, said: "We are very satisfied with the training we received at FIRA. Barry Worrell, our FIRA trainer, gave us excellent explanations and demonstrations to show us how to conduct the tests which highlighted his many years of experience in the job. Every day we are exposed to different situations that require us to make decisions and we feel that our training will enable us to do this effectively."

With sixty years of unparalleled knowledge of the furniture and related industries, FIRA offers a wide range of product testing and has a proven track record in designing and manufacturing test equipment that reflects the demands of the latest furniture test standards. FIRA has worked with laboratories throughout the world to provide high quality furniture test facilities. FIRA's worldwide network of partner laboratories includes FIRA-CMA in Hong Kong, and additional accredited facilities in Singapore and Malaysia.

Further more information, go to www.fira.co.uk











### From the creators of handheld thermal imaging

Introducing the world's smallest, lightweight, high resolution thermal imaging camera, the Argus Mi-TIC. As you would expect, this latest innovation from Argus provides crystal clear image quality at extremely high temperatures, whilst at the same time allowing you to clearly see very low temperature objects like casualties. The Mi-TIC is a small format thermal imager that can be easily and comfortably held in the palm of your hand. Its unique design allows rapid fixing to a pocket, BA straps or it can even be stored in a pocket for quick access. With a less than five second start up time and simple thumb operated functions the Mi-TIC delivers a unique balance between industry leading performance and ease of use.



### Unmanned Aerial Systems - Urban Firefighting's next tool?

David Copenhaver & Frank Woodward

A hose, a ladder, an axe, protective gear, a truck, a flashlight, a personal locator device, an Unmanned Aerial System (UAS), can this be the next technology breakthrough in urban firefighting?

or the past few years discussions of UAS in •firefighting have centered around forest-fires, and how to utilise unmanned assets to better predict movement, document fuel sources in the path and gather data to support deployment efforts to combat the fire. Now, startup companies like Nitrofirex of Spain are developing deployable UAS gliders that will allow Night Time Fighting of Forest Fires. According to company president Luis Bordallo, "Nitrofirex has obtained a global patent on a new approach in the world of the aerial vehicles, which aims to develop the capacity of spraying or spreading a large payload in a hostile, difficult or impossible to access environments using 'Autonomous Gliding Containers' (AGC) these carry the payload from C-130 type Launch Aircraft (LA) from altitude. The payload is delivered to the programmed release point autonomously with pinpoint accuracy. Once empty and removed from the fire zone, the AGC begin their recovery phase by means of their engine, recovering and landing in the base of operation of the LA in a completely autonomous way. The company is still in the viability and design phase, but has the attention of university researchers, investors, and the aeronautical community."

So if this could be the future of aerial forest fire fighting, how can UAS impact the urban or metropolitan firefighter? We have all read articles and heard statements from politicians about the 'privacy concerns' of using unmanned aircraft in law enforcement applications, so how does the firefighting community avoid the political issues of incorporating UAS into the basic tools that are currently used to protect property and save lives of citizens and first responders?

One company that is working to solve this problem is Information Processing Systems Inc. (IPS). For over 40 years, IPS has specialized in building interoperable communications systems for first responders and the military. These quickly deployable Mobile Command Vehicles (MCV) and incident command mobile carts integrate these aerial, ground, and subsurface remotely controlled robotic platforms with cameras and sensors into a ground control station. Each UAS or Remotely

### **AERIAL DEVICES**



Operated Vehicle (ROV) is connected with or without a tether to the ground station which provides the GIS software solution for providing a Common Operating Picture (COP) to First Responders on scene – as well as a backhaul via satellite to the strategic command.

In the last twelve years, there have been tremendous efforts made to make sure that in emergency response situations, all first responders have the ability to communicate seamlessly across all responding agency radio communication systems. We could envision a new situation where first responders could be creating stand alone islands of both Metadata and Video data. Command Centers are now accumulating from these independent robotic sensors (such as UAS, ROV, throwbots, and other unmanned platforms) large databases of actionable data that benefits all responding agencies and not having the means to share this information to all responding agencies. There was a possibility that the National Guard would arrive with their UAS; the County Sheriff's department with their ROV for underwater search and rescue; the local police with their aerial asset, the Fire Department with their UAS, and Federal agencies like DHS or Forest Service could all arrive on scene with manned/unmanned assets and each one with their own Command and Control UAS/ROV response vehicle. So we began working with industry manufacturers like VideoRay, Hoverfly, RP Flight, Sofcoast, and ISIS Copters to integrate their UAS and ROV products into the IPS MCV, with the focus on creating the next generation of incident response vehicle. But like most commercial companies, we focused our sales and marketing efforts on the homeland security market.

However, we quickly learned from our UAS manufacturing partners that in today's personal and political environment, safe free flight of UAS in the national airspace for security and surveil-

lance in most countries is still being evaluated and studied, and awaiting regulation by government agencies responsible for aviation safety and addressing the public's privacy concerns.

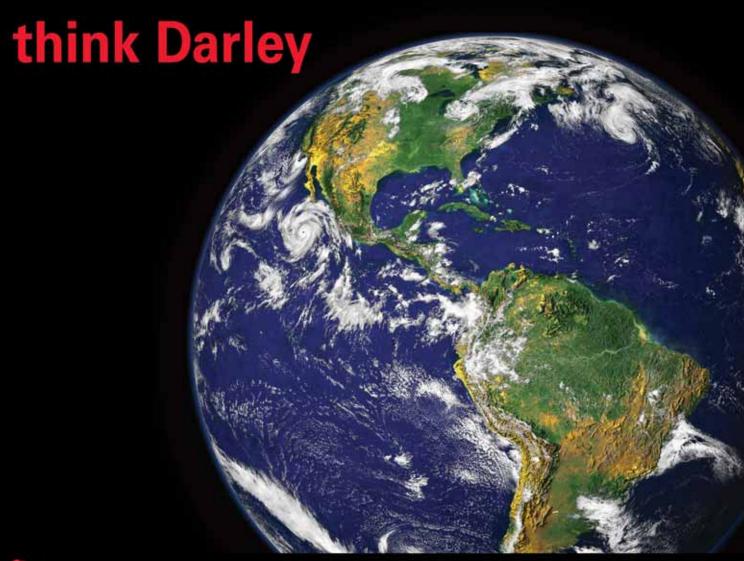
In an effort to develop alternate marketing opportunities, we exhibited the IPS Nexgen MCV with aerial and underwater unmanned systems at the recent FDIC 2013 (Fire Department Instructors Conference) held in Indianapolis, we learned from departments from all over the world that they are looking for UAS solutions that are quickly deployable, cost effective, public-friendly tools for creating immediate situational awareness upon arriving on site. We heard current methods for developing an aerial view that provides actionable information to help commanders make informed decisions at the response site could range from camera – mounted mast on trucks; to cameras mounted on snorkel or ladder trucks: to watching video from the news helicopter or in some instances the Police helicopter can provide video to a responding police car. These all have some value to emergency responders, but many times what they really need is not just situational awareness they also need persistent (constant) surveillance.

One very powerful tool for situational awareness and persistent surveillance is a tethered UAS, either a rotary wing quadcopter or hexacopter capable of maintaining a controlled hover at 150ft above the scene and we are not alone in that assessment. One of the leading UAS industry experts, Patrick Egan who is the Editor of the Americas Desk at sUAS (Small Unmanned Aerial Systems) News and the host and executive producer of the sUAS News Podcast Series was recently quoted as saying, "Those in the UAS industry looking for a lasting opportunity should be beating a path to the firefighter end-users door with systems that address safe, controlled, cost effective platforms that cannot be bundled under the



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### **AERIAL DEVICES**



misleading term 'drones' and will become just another tool in saving lives and property in large dwelling, structure fires or Hazmat situations."

For example, as a Battalion Chief, you are dispatched to a multiple alarm structure fire in your operations area, from each of your four assigned stations you have a truck respond that has a tethered hexacopter UAS with a high definition (HD) and infrared (IR) camera attached. The UAS is deployed from a box mounted on the top of the truck. The box contains a tether management system which provides power and a fibre optic video link down to the truck and broadcast capability to other responding equipment, command centers, tablets, or personal viewing devices. The UAS features an autopilot system that maintains altitude and position within 1 metre in winds gusting to 35 knots. The UAS is effective in temperature ranges from minus 10 to 150 degrees Fahrenheit and can maintain flight in rainfall up to 25mm per hour. Operation in thunderstorm conditions has the same risk or guidelines as a ladder or

As the trucks arrive on scene, they are deployed to each side of the fire. The engineer or driver immediately deploys the UAS to a programmed altitude determined by the structure height. On your in-vehicle monitor, you have access to all four incoming video feeds as you arrive on scene. The cameras can be controlled for pan, tilt, zoom or could be programmed in sweep mode to provide a 360 degree view of the surrounding structures, hazards, and citizens, vehicles, and access roads. Situational awareness is now being provided by ground and air in HD or IR in real time video images to command staff, ground leaders, and individual firefighters within minutes of arrival.

Upon your arrival, you deploy a portable command center from the back of your vehicle with monitors, radio communications, and a Common Operating Picture (COP) view showing the position of fire vehicles; personnel; all commercial, public, private aircraft above the scene; and current weather conditions in a real time view. You can click on an asset and the video being broadcast will be displayed in a window on the display. All

communications, video, and equipment and personnel positioning can be archived for later review or for training purposes.

During the FDIC show, we were approached by a fire boat manufacturer who after hearing the explanation of the UAS capability has begun offering the tethered UAS solution as an option on their fire boats. The only difference in the scenario is that all maritime traffic in the operations area would be displayed on the boat Captains COP.

There are numerous scenarios that could be defined where the UAS could play a key role in reducing the loss of property and life.

The UAS described in the example above are currently being built and tested by both Hoverfly in Winter Springs, FL and ISIS Copters in Carlsbad, CA for the urban fire-fighting market. Suggested

acquisition cost for systems currently being developed by both companies depending on number of rotors, camera type and image resolution would range from \$30,000 to \$75,000. Quick Deployment carts and MCV's with integrated aerial, underwater, and ground robot capability are available from IPS NexGen in San Carlos, CA, will range from \$18,000 to \$250,000 and the COP software developed by Simulyze, Inc and is available as a deployed server configuration for commercial applications, public agencies, and Educational Research Institutions has a license cost of \$75,000.

One of the issues common to the adoption of emerging technology in existing markets, especially within public agencies at local or state level is grant availability or funding sources. We believe that fire vehicle manufacturers will begin to offer integrated UAS as an option on all new equipment. Until that time, consider maintenance costs, truck upgrade or equipment improvement funds as sources of funding for UAS acquisition.

A major concern of most departments, who have expressed an interest or have pursued acquiring a UAS for their operations, has been the issue of having to obtain a Certificate of Authorisation (COA) prior to flight and current government restrictions pertaining to Free Flight UAS operations in the national airspace. One of the reasons for utilising low altitude, small form factor tethered UAS solutions is the elimination of 'uncontrolled fly away events' which could jeopardise manned aircraft operations. A tethered UAS can be compared to a kite or blimp operation requiring minimal or no government Aviation Authority regulations.

For information on the companies or organisations mentioned in this article, visit their websites:

www.nitrofirex.com/en www.IPSNexGen.com www.suasnews.com www.hoverflytech.com www.isiscopter.com www.videoray.com www.rpflightsystems.com

**David Copenhaver** and Frank Woodward have a combined 50 years experience in helping emerging small and large technology companies develop sales and marketing strategies for the public and private sector marketplace. Frank has over 25 years of operational and business development experience, working with companies in the marketing, sales, and development of leading edge technologies including Light Surveillance Aircraft, UAV's, HD/IR video, and Software Development. Frank was responsible for obtaining the first GSA schedule and DHS Safety Act certification given to a surveillance aerostat company in the US. David and Frank have international business development experience in delivering security and mission improvement solutions in the European

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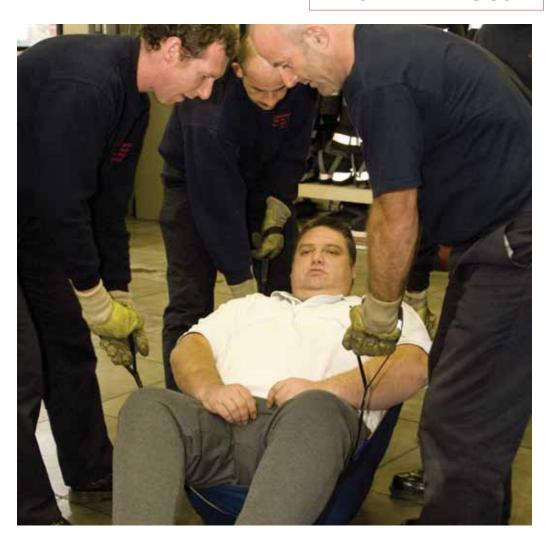


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### PROBLEM RESCUE





**Alison Hayward** 

### **Bariatric Rescue**

The problems created by the increasing obesity of the world population has always been present but over recent years it is becoming more and more of an issue to the First Response Emergency Services when being called out to attend a Bariatric Client.

odern lifestyle, the availability of food and lack of exercise all contribute to the problems they face. In this modern lifestyle we tend to drive everywhere complain if we don't have a TV remote and have to get up off our comfy chairs to change channel and because of our wonderful technology there is a lack of manual physical work which in the past kept all of us lean, fit and healthy.

The term Bariatric is a medical term used to describe obese clients these are usually persons who are in excess of 25 stone (159kg), is classified as Morbidly Obese with a body mass index of 40kg/m² or with a BMI of 35kg/m² with other additional co – morbidity problems.

Illness or accident historically were the main contributor to becoming Bariatric but as mentioned our lifestyles are now the main factor and the weight gain gradually creeps up and we gain weight over a period of time to a point of being obese without any major alarm bells ringing but

then with a blink of an eye the weight gain can accelerate and suddenly from being obese we become bariatric and this is when the manual handling issues to first responders becomes an issue. The problems of obesity fall in to two categories. Firstly there are changes of the anatomy and physiology that affect the obese. These create problems in airway management, ventilation, circulatory access and drug dosage. Then there are the effects of the sheer physical bulk and weight of the person.

By the time the BMI reaches 40 the person's mobility and health is being affected by their body fat. They will now begin to present problems of extrication once a person exceeds 20 stones they may be pushing the limits of the design load limit of the rescue equipment and the crew/teams will have to be looking to use specialist equipment to be able to safely move this person to protect the casualty and the staff members involved.

In the last 10 years there has been a mixed

### PROBLEM RESCUE



response from the emergency service providers with your main ones being the ambulance, fire and police as to what level of service they provided this ranged from well funded, well equipped specialist teams down to the prejudices in the services who were in denial to the issues and problems that the obese/bariatric persons presented this in turn caused inter agency friction.

Positively and more recently there is an acceptance of the issues and necessary steps are being taken to be responsible and find solutions to provide professional services and that the same level of service needs to be provided to all sectors of the community from tiny to large and to provide a safe working environment for their employees.

Providing a safe working environment is broken down into 2 sections the provision of suitable equipment and the correct training and safe systems of work for their staff.

There is now a wide variety of equipment available to assist moving a bariatric person these range from a simple slide sheet up to lifts and hoists, stretchers, evacuation chairs etc. The ProMove is an ideal solution if you are extricating a larger person from a RTA or aircraft etc. as this will carry up to 60 stones in weight. The EvacMat and Bariatric Rescue kits are also ideal choices as they provide the solution to keeping the person's body weight still whilst be able to slide them away to safety or taking them down stair cases without any physical lifting involved and because of the moving handles the crews involved can all be in a good working position.

In dealing with any bariatric incident the equipment is only a small part of a successful result of the situation the bigger picture is the knowledge, understanding and training of the personnel attending. It is important that the first responders have the knowledge both of the medical/physical and emotional conditions of the bariatric casualty. If the first responder understands these conditions then they will be able to provide and demonstrate empathy to the casualty. Often this person will be living their lives to their emotional physical and emotional extremes and won't have any reserve to

cope with trauma you often find that this person may be depressed, agoraphobic, have low self esteem, have panic attacks and may be suffering from embarrassment and shame.

You will often find that this person has respiratory problems due to the fat corset and their body weight pushing down onto their ribs and their diaphragm being pushed up, they have to work hard just to breathe and become deoxygenated when they are lay down. These persons are frequently difficult to intubate and popping a towel or folded blanket under the shoulders and head can help.

Because of the strain on the circulatory system cardiac arrest is more likely this presents problems with canulation because the fat layer obstructing major blood vessels. Expert knowledge is required to administrate drugs due to the person's body weight. Defibrillators are not used in the normal way for a bariatric client again due to the lack of effectiveness because of the fat layer. Staff need to be trained on the correct moving and handling techniques of a bariatric client so that minimal disruption is caused to the person and all personnel attending are protected from injury.

'Out of Scope Factors' need to be taken into account – for example structural issues and floor loadings. Do floors need propping? Will there be a need to deploy the Urban Search and Rescue Team (USAR)? Are staircases and equipment available are they all fit and have the weight limit for the task ahead?

Planning of the rescue before implementation is vital for example looking at the route out is there any pinch points where you may get a larger person stuck in tight corners identifying any potential hazards, requesting specialist equipment and more personnel if required are all important factors when handling a bariatric person and not forgetting the all important 'empathy' because this person could be your mother, father, brother, sister, son or daughter and you would want them moved in the safest kindest way.

The future of the Bariatric response will rely more and more on specialist response teams e.g. Ambulance HART, USAR or rope rescue because of their experiences and in depth knowledge and their range of bariatric equipment available to them. Financially it is not viable to kit every vehicle out with a full range of equipment. We are seeing more of the main service providers outsourcing bariatric incidents to specialist bariatric providers.

One thing is for sure this is not going to go away and increasingly first responders will be being called out to larger persons but with the correct and training and equipment available hopefully this will be manageable.

Alison Hayward is a moving and handling consultant with Hospital Aids Ltd

For more information, go to www.hospitalaids.co.uk



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### 'Improving Firefighter Safety - A European Perspective'

### Federation of the European Union's Conference Review

On the 17th of May, more than 120 delegates from across 22 different European countries gathered at the headquarters of the Nottinghamshire Fire and Rescue Service to attend the FEU Conference, to discuss how to improve firefighter safety and share best practice knowledge across Europe.

he topic for discussion, 'Improving Firefighter Safety – A European Perspective', had been chosen to address one of the five key themes in the Federation of the European Union's (FEU) 2020 vision document. Over three days delegates shared ideas and best practice, while discussing the benefits of working collaboratively to improve safety.

The conference, hosted by the FEU Fire Officer Association and sponsored by DuPont, saw a series of presentations and demonstrations discussing the role of fibre, fabric construction and design of garments in protecting firefighters, developments in respiratory protection, the importance of firefighter training and wellbeing research. There were also first-hand accounts from Slovenia Fire & Rescue Service and the lessons learned from the Shirley Towers incident from Hampshire Fire and Rescue Service. The conference fell on the day that Sir Ken Knight published his independent review of the fire and rescue services in England. One of the key recommendations



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was to merge some of the 46 separate fire and rescue authorities in England, prompting mixed debate and discussion on the day.

### 2020 vision

The FEU's vision 2020 document contributes directly to a stronger European disaster response and includes five key themes and areas of activity; improving EU citizen safety; improving firefighter safety; improving influence on policy formation; improving sharing of good practice and improving crisis management. This year's key theme - firefighter safety - is the responsibility of Lead Officer Oilli-Pekka Ojanen of the Finnish Association of Fire Chiefs. Through his role as Chief Fire Officer (CFO) in Tampere, Finland, Oili-Pekka was keen to develop the project further and agreed with CFO Frank Swann, the Chief Fire Officers Association UK lead, to help put on a conference day which brought experts from across the field to share in the development of technology and equipment, experience and learning for the benefit of the wider fire and rescue community.

### Sir Ken Knight report

CFO president and CFO of Midlands Vij Randeniya opened the conference by referencing the days news, "Most of you will have woken up to Sir Ken Knight's report suggesting that England's Fire and Rescue Services need to transform to become more efficient and effective. It is important that we modernise and adapt our fire and rescue services to reflect the changing demands and needs of both firefighters and greater society. Sir Knight was quite right in his report where he said 'there is a lot to learn' because for anyone involved in saving lives learning never stops. What we really need at this time is to be bold, to listen and learn from each other".

### The importance of turnout gear

Manufacturers working in the personal protective equipment (PPE) industry appreciate only too well the huge responsibility that is bestowed upon them. Whilst no PPE will ever give complete protection against firefighting risks, manufacturers are constantly looking at ways to improve turnout gear and give extra seconds of safety when it counts. At the conference DuPont, Hainsworth and Bristol Uniform each took turns explaining the technology, hard work and innovation that goes into keeping firefighters safe through fibre, fabric construction and garment design.

Zoltan Nahoczky, DuPont™ Nomex® Apparel Segment Manager, explained, "Heat stress is the most common firefighter casualty and using the most effective fibre within turnout gear is absolutely key to keeping firefighters safe. Fabrics with Nomex® fibres tend to remain breathable longer, contributing to lower risk of heat stress. On top of this Nomex® fibres use up heat energy by changing its molecular structure and thickening when exposed to intense heat therefore giving active protection. Nomex® is exceptionally durable which help firefighters to keep repair and replacement budgets under control, without compromising on safety".

Tom Hainsworth, Managing Director of Hainsworth, explained how Hainsworth is reducing heat and flame impact through innovative fabric design. Simon Burnett-Boothroyd, Hainsworth's

Sales & Innovation Executive – Protection, explained, "Hainsworth fabrics use an intelligent design and phase-change Nomex® fibres that absorb energy, resulting in the reduction of total impact to keep firefighters safe and reduce the possibility of heat stress whilst high tensile strength gives best value possible and garment longevity".

Phil Tasker, National Sales Manager at Bristol Uniform, which supplies around 7,000 garments a year to the UK's fire and rescue services, rounded off the PPE discussion, covering the innovative garments recently designed that reflect the changing roles and demands of the modern firefighter. Tasker explained the importance of design, specification, advice and maintenance when keeping firefighters safe at work, concluding that the fibre-to-product partnership between Nomex® Partner Programme partners DuPont, Hainsworth and Bristol Uniform has made significant improvements in firefighter safety.

### **Breathing safely**

While heat and flame protective garments are one of the vital components of firefighter safety, respiratory protection also plays a crucial role. Dräger, one of the global leaders in safety equipment, gave a hands-on presentation of the developments the company has in progress. Henri Schwegman, Regional Marketing Manager at Dräger, explained, "Currently we are developing BA sets with lighter, stronger materials, improved ergonomics, electronic monitoring and telemetry, smart digital communication and entry control". Matthew Evans, Global Business Manager -Segment Fire Services at Dräger, unveiled the company's research into liquid air that could potentially lower the weight of oxygen cylinders from 13kg to 6kg and increase capacity from 3 litres to 9 litres. Dräger's flexible, flatpack self contained breathing apparatus design utilising compressed air technology was demonstrated which generated much interest from the audience. Evans concluded, "We can improve and force technology on firefighters for technology sake, but it is wasted unless it is going to improve things for firefighters and be used. A collaborative approach, where technologies are able to fit together, is needed in order to move things forward".

### **Slovenian example**

Throughout Europe there are differing levels of compliance and unique issues that fire and rescue services are tackling. Matej Kejžar, Commanding Fire Officer in Kranj, Slovenia, gave an account of the perception of safety in Slovenia, sharing key strategies and successes with improving the attitude towards safety in Slovenia. Kejžar began, "With the 750 firefighters in Slovenia often seen as supermen, it has been incredibly difficult to change this attitude. Tactics to improve firefighter safety included increased training, better equipped fire stations and psychophysical conditions evaluated regularly". Kejžar concluded, "The exchange of information between fire and rescue services has been crucial, and is absolutely integral to moving safety forward. We are working on improving interoperability between services in Slovenia, and we can learn a lot by watching other successful security operations, such as London 2012 Olympics.



### FEU CONFERENCE



### Learning from disasters – the Shirley Towers incident

One of the most anticipated talks from the day, John Bonney, CFO of Hampshire Fire and Rescue Service in England gave a frank and open presentation on the series of failings that occurred during an emergency call out to a block of 'scissor' design flats had ended in the death of two firefighters in 2010. Bonney guided the audience through the key learning points and gave an account of how the incident was handled. Some of the errors included; the breakdown in despatch communications, poor signage in the flats, cabling and fabrics that collapsed from the ceiling and were caught between the cylinder and backplate, thermal imaging cameras were not used, the BA control board had run out of room and a window was opened causing a fire flashover during the incident. Bonney concluded, "The main piece of advice to take away today is to work through an negative experience as a team. The second we point the finger of blame our services become fragmented, we must exchange knowledge and learn from mistakes".

### Firefighter wellbeing research

As with most other employees in demanding roles, firefighters are subject to a variety of stresses and strains that impact on their wellbeing. Sirpa Lusa, Senior Research Scientist at the Finnish Institute of Occupational Health, presented her research, revealing that musculo skeletal disorders, sleeping problems and body mass index amongst firefighters had dramatically increased since 1996. A direct correlation was also made between the firefighter occupation and life expectancy prompting many questions and comments from the attendees. Lusa suggested that health checks should be increased and requirements simplified to avoid compliance issues and extended an invitation to attendees to join her research network to improve and promote best practice across Europe.

### The importance of preparation

One of the key themes throughout the conference was the idea of preparation and ensuring that fire-

fighters and their support network are prepared where possible. Helen Tooley, Group Manager Strategic Development at Fire Service College, emphasised the need for a national standard across Europe. Tooley said, "As there is less on the job training, it is now more important than ever to make training as realistic as possible. The college has a variety of training scenarios, including helicopters, oil and gas rigs, railways, embankments, aircrafts and ships and we have set up clear learner pathways to give learners options throughout their career in the fire and rescue services".

### A lasting impact

"As a fire service we want to play our part in the European Union and make a positive contribution to firefighter safety", concluded Vice President of CFOA, Paul Fuller during the closing address. "We have come here today to share our common interest in firefighter safety and to hear and share different ideas across the EU. Going forward, it needs to be much more about sector wide partnership to improve firefighter safety".

The conference generated positive feedback from many of the delegates. Dräger's Matthew Evans described it as "one of the most informative meetings I have attended in a long while". Des Prichard, CFO and Chief Executive of East Sussex Fire and Rescue Service, said: "Delegates enjoyed lively debate and considered strategies to lobby the European Parliament to promote safety and sustainability initiatives across the EU area, and discussed sharing data and good practice and the benefits of being members of the FEU."

Nottinghamshire's Chief Fire Officer Frank Swann said: "A great deal of positive work has already been done since the FEU's formation in the early 1990s, with the FEU leading the way in a number of projects which have influenced and developed the role of the firefighter. I am confident that this year's conference has gone a long way to improving links even further between our neighbouring countries and will serve as a solid foundation to future work and projects for many years to come."

The next meeting of the FEU will be in October in Antwerp, Belgium.

Further more information, go to www.f-e-u.org.



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# Structural Fire Fighting Gloves

### - Are they really all the same?

Personal protective equipment (PPE) has developed extremely quickly over the last 20 years allowing firefighters to be exposed to greater temperatures for longer. It is in the area of understanding the risk and hazards which has brought about our biggest changes. Modern construction and manufacturing methods have introduced changes to how fire behaves and develops. PPE designers are working hard to produce garments which are fit for purpose and at the same time are cost effective.

Jim Malin

here's probably no single piece of fire fighting PPE that arouses more passionate discussions among firefighters and procurement officers than gloves. Proper fit, standards, manual dexterity, thermal protection, overall durability and the overall appearance are usually the primary topics.

### How do you pick the right glove?

A large majority of organisations are still working on the assumption that one glove fits every risk that fire and rescue services and other sector providers are expected to legally provide a response for. This is very difficult to achieve as there is always a trade off with regards to providing a glove which has high thermal protection and dexterity. Other design qualities are built into each glove for consideration making them more attractive to would be buyers.

When identifying a fire fighting glove, the starting point is to look at the standards the products comply with. The main standards for fire fighting gloves in the United Kingdom are European standard *EN659:2003+A1: AC:2009 Protective gloves for Firefighters* and the American *NFPA®* 1971-2013 standards along with other

standards such as EN388 and EN420.

BS EN659 is a European Standard which defines minimum performance requirements and test methods for firefighters protective gloves.

BS EN659 applies only to firefighters protective gloves which protect the hands during normal fire fighting, including search and rescue.

As indicated above the EN or NFPA standards cover the minimum performance requirements which organisations use to ensure they meet their legal requirements in that they have a duty of care for the health safety and welfare for all personnel working for them.

So when trying to pick the right gloves, simply applying the standard alone is not enough as there are extreme variations between the highest performing gloves and the worst even though they all comply.

### The other factors to be considered are as follows:

### The design

The gloves should have an ergonomic design both in the shell and liner with reinforcements in knuckles

### **GLOVES**

and palm part for the best protection performance. The ideal shape for a fire fighter glove is a claw-design which aides dexterity. The gloves should ideally be made from one continuous piece of leather which negates the need for extra stitching around the fingers with a potential loss of structural integrity.

There are several different ways that gloves can be constructed that relate to the way the fingers and thumb are set in the glove pattern. Seam location is critical in affecting hand function because inappropriately placed seams can cause poor fit and hand function.

### **Materials**

### **Outer layer**

The main material for fire fighting gloves is leather, obtained from various animals such as Cow, Elk, Moose, Pig and Lamb. The way they are prepared for manufacture is where the difference is. Most gloves will either be grain leather or split hide leather and there are pros and cons with each. These leathers have different characteristics in terms of their durability as well as their suppleness.

### **Inner Lavers**

There can be a number of inner layers based on what protection is required overall. The inner layers will be fixed to the outer shell in some way either stitched or glued although stitching can increase the bulk of the glove. The overall dexterity of a glove is badly affected with increased number of layers.

The layers can be:

- Water proof membrane
- Cut protection
- Thermal protection
- Pathogen barrier
- Protection against certain chemicals

### Compatibility

A major consideration when procuring gloves is the compatibility with other garments such as the fire tunic. There are two main considerations here and they relate to the cuff. The cuff can be internal or external with most fire and rescue services adopting a knitted cuff and this should also provide arterial protection around the wrist. The external cuff is normally designed around a slit hide leather configuration and is a funnel shaped and is extremely popular with training departments as the speed of donning and doffing is very quick.

### **Care and Maintenance**

Critical to the use of any PPE is how it is looked after. A critical consideration should be how easy the product is cleaned and cared for. It is essential that the glove which is chosen can be machine washed at low temperatures without the performance of the glove being affected.

For all the components of the structural fire fighting ensemble, gloves take the brunt of abuse during fire fighting operations. Proper care and cleaning helps preserve the glove's fit and shape, maintains the glove's thermal protection properties and extends its lifecycle.

Some gloves on the market have been known to shrink and go hard after washing which is certainly something to look out for.

So what is out there?

There are a number of manufacturers supplying structural fire fighting gloves in the UK. What is essential that the gloves being supplied meet the need and operational demands being placed on firefighters across the country on a daily basis. This brings us back to the same dichotomy faced by manufacturer's, making something which provides great protection, fits extremely well and has amazing dexterity.

Current manufacturers and suppliers of gloves in the UK include; Southcombe Bros, Shelby, Bennetts and Granqvists. This list is not exhaustive, but a sample of some of the larger manufacturers who supply to the fire sector in the UK.

A company gaining popularity within the UK market over recent years is Granqvists – a Swedish based in Sweden who produces the specialist structural fire fighting glove the 'Fire Grip B0901'. This seems to be the glove of choice with fire and rescue service trainers who provide real fire training. This glove has been independently tested, in Switzerland, against other gloves using the 'Thermo Hand' test facility. These tests were instigated by a fire and rescue service experiencing high burn levels to firefighters. The burns were eradicated with the introduction of 'Fire Grip' glove. The Fire Grip is also the recommended glove for the airport fire services because of the high qualities delivered due to the materials used and as a result of 'Thermo Hand' tests.

The results from the 'Thermo Hand' tests carried out on the Granqvists RB-90 gloves resulted in the following statement – 'The thermal performance on the Thermo-Hand (TPP) shows a very good result, the time to pain is 31.7 seconds and the time to 2nd degree burn is 40 seconds'.

### **Summary**

Structural fire fighting gloves are an essential piece of PPE and one area which can be easily overlooked. The performance in real life situations should be the guide to manufacturers and procurement officers alike. It is essential that lessons from high profile incidents are noted and acted upon to ensure that we provide firefighters with the best products available to them. It is vitally important that the fire sector understand the risks and hazards, so that when a response is required personnel have the right equipment, PPE and training to protect themselves in any fire situation.

It is clear that using the EN and NFPA standards are not enough when procuring this essential piece of PPE. Consideration must be given to a range of other factors none more important than listening to the end user. Structural fire fighting requires the appropriate product, not one that can do everything, because what we have learned is there is always a compromise between protection and dexterity.

It is important to know which materials the gloves are constructed of, the specific design features of gloves which will affect hand function and protection, and the available sizing of gloves to fit all sizes of hands.

To finish, we should realise that protecting firefighters hands from fire hazards is actually a relatively difficult challenge; but with a little thought, research and a full understanding of what we want the gloves to do it can be achieved with the desired outcome being increased safety.

Jim Malin is Business Development Director at Firefighter Protection (UK) Ltd.

For further information, go to www.firefighterprotection. co.uk





### Marine Firefightin who needs it?





**Tom Guldner** 

Many land based firefighters have the feeling that a fire is a fire, no matter where it is – 'Just point me at the flames and I'll put out anything!'

his macho attitude may get the admiration of the uninformed and easily impressed, however, experienced fire fighters know that you never stop encountering new things and learning from them. In some way, every fire is different and that's what makes this job so interesting.

Fighting a fire on a ship is in some ways similar to fighting a structural fire; but there are many very crucial exceptions. Access is a good example. When you arrive at a building, there is a door. You may have to force it, but you know that it is the way in. When you arrive at a fire aboard a ship at anchor there are no doors. If you're lucky there will be an 'accommodation ladder' angled and unsupported down the side of the ship.

If you are then able to step from the pitching and rolling deck of your boat onto this ladder you will find that each step will send this possibly thirty year old, 80-100 foot, unsupported accommodation ladder bouncing several feet up and down. Just climbing this thing is a chore. Add bunker gear and it becomes an exhausting and unsafe challenge! What about your tools, masks, hose and any other special equipment that will be needed? The equipment problem is answered by looking on the deck of most large ships. They must load and unload their own supplies and

heavy machine parts so there will be some form of lifting device. Whether it is a boom, a davit or a crane, it is the best way to get your equipment and fire gear aboard.

Once aboard you will be confronted with something you might be familiar with. It is a high rise building with about a dozen major operating systems. Only this building is on its side, and can move. Just as building construction is important to structural fire fighting, knowledge of ship construction can be the difference between life and death to shipboard fire fighting. If you get lost during a search (very common at ship fires) the knowledge of bulkhead and frame markings may either lead you out, or enable help to get to you.

Some questions you should ask yourself are:

- Do you know what a 'bulkhead' or a 'frame' is?
- How about the difference between a 'deck' and a 'level'?
- Where is the 'Bosun locker', the 'bilge', or 'shaft alley'?
- What is a 'cofferdam'?
- Where is the fire?

There are several places aboard ship where detectors and alarms will indicate the source of smoke and heat. Would you know where to find them? After you determine the location of the fire,

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### g Training -

how are you going to get there? Aboard ships there are several sets of fire plans and ship plans which will give you the layout of the ships decks, stairs, phones, watertight bulkheads, self closing fireproof doors etc. Would you know where to look for these plans and if you found them, would you know how to read them?

- What is burning?
- What is in the cargo holds or tanks?
- Are there hazardous materials aboard?
- Where would you find out this information?
- How are you going to keep the ship from sinking? Or worse, violently capsizing from the weight of all of the fire fighting water?
- How are you going to ventilate this fire?
   With ship fires, sometimes the question is if you are going to ventilate. At many ship fires you will be removing ventilation and 'buttoning up' the ship!
- When you call for help with 'a line' aboard ship you might be a little disappointed when someone hands you a rope. Ask for help with a 'Hose line' when talking to a mariner. Knowledge of some vital shipboard terminology is a must.

If you were able to solve the problems I have just presented then possibly you may not need training in Shipboard fire fighting. Personally, I'm not young enough to know everything! I hope I have captured your attention enough for you to realize that you may need this information.

This series of articles is not intended to teach you everything about marine fire fighting. The US Coast Guard combined course in basic/advanced shipboard fire fighting for mariners is 45 hours of lectures and practical application. My articles will only allow me to discuss a few of the problems we just mentioned. I will be writing about a field of fire fighting that has been neglected in both training and budget allocation for many years. I hope that these articles will give you some important safety information but I also want them to demonstrate to you that your fire and rescue service must take marine fire fighting training seriously.





The next article will start with the basics. We will learn the nomenclature of some areas and items aboard ship you will need to know. You don't have to become an 'old salt', but you should know direction aboard. Forward, aft, amidships, bow, stern, port, starboard, below, and above. You will learn the markings on the outside of the ship, the plimsoll line, draft markings, hold bulkhead marks, which will all give you valuable information about the stability of the ship and possibly the location of the fire. We will also mention some of the structural elements of a ship that may apply to marine fire fighting.

In future articles we will discuss vessel stability and de-watering and will feature some shipboard safety and tactical procedures that can be used to advantage to enable your firefighters to operate safely at a shipboard fire and then go home uninjured after the job is done.

Remember, your area doesn't have to have a port in its district for this information to be important. If your area is merely adjacent to a waterway where these ships pass, you may be called when its engine room erupts in fire as it passes your jurisdiction. You may also be called in on mutual aid to a neighbouring area that does have a port or river frontage. Are you ready?

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and training mariners and
land based firefighters in all
aspects of marine fire
fighting.

For more information, go to www.marinefirefighting.com

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# Thatched Roofs The importance of Separation in Construction



**Rob Norcott** 

### **Thatch Overview**

Statistically, homes with thatched roofs are no more likely to catch fire than those with conventional roofs if the owner is made aware and understands the risk of thatch fire. However, if a thatched roof does ignite, and is allowed to develop it's almost impossible to control and the results can be devastating.

ue to the difficulties associated with fire fighting a thatched roof and the fact that most of these properties are not fitted with any form of fire barrier system, the outcome is very often just four walls and a chimney stack remaining. Therefore thatched fires will always make "headline" news!

Given the nature of this publication, one could assume the majority of readers are acutely aware

of the unfortunate number of thatch fires that have recently made the headlines and continue to do so. In the UK, since the turn of the year there have been over 40 fires affecting thatched properties, with 12 during the Easter weekend alone.

Notwithstanding the loss and trauma to the home-owners, it is incredibly fortunate that none of these headlines have had a tragic element to them.

### THATCH FIRES

Pic © Thatching Advisory Services



With this in mind and given that early investigations indicate that a large proportion of these fires have been attributed to either embers ejecting from the chimney or other related issues with regard to faulty chimneys or liners. More information needs to be made available to ensure that home-owners, fire and rescue services, thatchers, architects and insurance companies are made aware of the issues.

### Thatching Advisory Services (TAS) – An Overview

For nearly 40 years, TAS has provided unrivalled expertise in the protection of thatched buildings and has been offering advice and guidance on the preventative and protective options available. We are often the first port of call for architects, local authority building control departments, thatchers and home-owners.

Over the years we have developed close working relationships with many of the leading insurance companies, test houses and product manufacturers and as part of the continuous feedback that we receive, we have continued to develop our range of fire barrier systems that can be fitted to both new and existing thatched roofs. These act to create a separation between the thatch and the roof timbers in the event of a fire.

Even though every thatched fire will vary due to many things such as weather conditions, location of property, thickness of the thatch etc. – the key objective of any fire barrier system is to buy more time. Additionally with the use of a comprehensive fire barrier system there is a much higher chance of the main fabric of the building being retained.

By joining forces and sharing skills, knowledge and information, we can all play a part in reducing the risk to the occupants and the many listed buildings which in most cases are almost destroyed as a result of a thatch fire. This will also help to maintain the thatching industry and continue to promote the desirability of owning a

thatched house whilst at the same time helping to protect our heritage for future generations.

### **Common Causes**

Thatch roof fires can be attributed to many different causes ranging from old or faulty electrical systems through to the likes of bonfires or fireworks. However, it is widely accepted that there are two main causes of thatch fires which are both in relation to chimneys and the use of wood burning or multi-fuel stoves.

The two main causes are; heat transfer and ejected embers or sparks from chimneys.

### **Heat Transfer**

Wood burners and multi-fuel stoves can generate very high gas temperatures; this in turn can be transferred through the brickwork of the chimney to the thatch, this is known as 'Heat Transfer'. 'Heat Transfer' is further increased at the point that the thatch meets the chimney; this is due to the insulating properties of the thatching material.

The 'Heat Transfer' process can cause thatch to smoulder and ignite if temperatures in excess of 200°C are reached. Studies show that wood burners and multi-fuel stoves being installed into thatched properties are a major cause of thatch fires.

This is mainly due to faulty chimneys, poorly or incorrectly fitted liners, combined with high flue gas temperatures being generated by these efficient stoves.

Worse still the thatch is at a much greater risk of the effects of Heat Transfer if the chimney is not lined, additionally the transfer process can be accelerated if the condition of the brick work or mortar has degraded over the years.

In many cases the lower section of the chimney has not seen the light of day for over 20 years due to the thatch being in place.

A modern insulated liner system that has been correctly installed and maintained to current building regulations will dramatically reduce the risk of Heat Transfer occurring in the first place.

### **THATCH FIRES**

### Ejected Embers or Sparks

Embers or sparks exiting the chimney have been accredited to the cause of many thatch fires and when investigations have been completed following a thatch fire it has been identified that fires were reported within 30 minutes of a fire being lit or being re-fuelled.

Several issues can increase the risk of the effects from ejected embers or sparks, these include:

- Spark Arrestors if not cleaned at least once a year they can clog up and will catch fire in their own right, which in turn could cause a thatch fire.
- Chimney Height the risk of a thatch fire is further increased when the chimney height has been reduced following many years of recoating works. It is common practice for thatchers not to strip off all of the



Pic © Thatching Advisory Services



### THATCH FIRES



We would also recommend that property owners that aren't planning to install new appliances still seek advice from the likes of Solid Fuel Association or HETAS if they have any concerns.

Many of the specialist insurance companies either require a CCTV chimney survey or they offer this an option. Given some of the issues already mentioned above, we would always recommend that this is a good precaution for any home owner.

old thatch during the completion of new thatching works; this is more common with thatching materials such as long straw.

Many will refer to a long straw roof as multi-layered and in some cases the lower layers of thatch can date back hundreds of years.

### Other chimney related Issues

Many chimneys are not lined correctly, for example, if a flexi liner is installed incorrectly and is therefore allowed to touch the side of the chimney it can cause a hot spot, which in turn will dramatically accelerate the process of heat transfer.

Bricks missing, again as already mentioned it impossible to check the condition of the chimney at the point that it passes through the thatch, useless the thatch is removed or an internal CCTV type survey is completed.

### **Education**

It is still a fact that many thatch fires could have been prevented if more information had been given to the property owner with a view to enabling them to have a better appreciation of good practice.

### **Solutions**

Thatch as a modern day roofing material is becoming increasingly popular due to its favourable insulation properties and aesthetic qualities. With an increase in new build properties and extensions to existing thatch properties and changes in building regulations there is a great deal of confusion relating to the fire barriers and retardants that can be used on thatched properties.

### **Address the common causes**

### Chimneys

As already mentioned chimneys are a big area for concern and needs to be the main area for the property owner to consider if they are planning to use a wood burning or multi-fuel stoves or even an open fire. In the UK, if a new appliance is installed, then the complete installation to include the liner and the height of the chimney has to comply with current building regulations as detailed in Approval Document J.

A suitable liner is a must for any operational chimney in a thatched property, especially when a wood burning or multi-fuel stove is being used.

### Other causes

Advice is available to help the property owner address and consider what precautions they can take to reduce the risk of a fire in the first place. In addition to the information available on our website, most UK Fire & Rescue Services publish a 'Thatch Information Pack' which gives useful details and advice as to how the owner can reduce the risk of a fire.

### Fire Barriers - Reasons to Install

Physical Fire Barriers for thatched roofs are designed to create a separation between the thatch and the rest of the building. The principle is that in the event of a fire the thatch is seen as sacrificial.

Although many barriers are sold individually we prefer to promote the use of Fire Barrier Systems, we have two systems available, either the rigid 'Fire Board System' or the flexible 'Fire Membrane System'.

In terms of fire resistance we use either the board or the membrane to achieve the required integrity and the non-combustible Thatchbatt® (Rock Mineral) as the insulation.

Fireboards and membranes are designed to resist spread of flame and penetration as set out in BS476: Part 3: 2004 & CEN/TS 1187: 2012, test 4. Both products are water resistant and will therefore reduce the potential water damage that is normally generated as part of the fire fighting process.

The fireboards are normally used for new builds, extensions or totally refurbished buildings where the timbers are straight enough to take the rigid boards. When used with the Thatchbatt as part of a system the fire board will then also meet the criteria of the 'Dorset Model'.

The membranes are normally used on existing roofs that are not straight enough to accept the rigid fireboard system.

The high density non-combustible Thatchbatts are designed to be friction fitted between the roof timbers, which will give greater protection by reducing the thermal transfer around the roof timbers and therefore reducing the risk of secondary fires starting and potentially resulting in roof collapse. If the Thatchbatts are installed at the same depth as the roof timbers, then the fire resistance is increased in terms of reducing the charring to the roof timbers.

In addition to friction fitting the Thatchbatts,

we also recommend the use of a stainless steel wire fixing system which ensures that the Thatchbatts remain in place and also helps protect the roof structure from either a fire on the outside or on the inside.

To meet the guidelines set out in Building Control Approved Document B, both systems are tested to BS476: Part 3: 2004 & CEN/TS 1187: 2012, test 4 which are the required standards for pitched roofs.

### Fire Retardant Sprays

Because some thatched roofs will never be stripped back to the roof timbers, they are unlikely to ever have a physical fire barrier system installed. Therefore we are seeing an increased interest from both home-owners and insurance companies to have the outside of the roof treated with our TAS Thatchsayf Fire Retardant Spray.

The main purpose of a fire retardant is to starve the ignition area of oxygen and therefore delay the spread of flame and the full development of a thatch fire. Again the idea is to buy more time so that the fire and rescue service have a greater chance of extinguishing the fire before it fully develops.

Normally applied with specialist spraying equipment, fire retardants do not alter the appearance of the thatch and have a life expectancy of five years. The application of a fire retardant could prove effective in preventing sparks and embers ejected from the chimney from gaining hold on the thatched roof and preventing the fire from spreading.

Thatchsayf is a water-based solution containing fire retardant and intumescent chemicals for the protection of thatched roofing. When applied correctly, Thatchsayf penetrates the stems of the thatch by up to 75mm, forming a thin protective film on the surface of the thatch stems.

On exposure to sparks from chimneys, bonfires or barbeques, Thatchsayf will intumesce and form a carbonised char, which binds the thatch stems together, cutting off the supply of oxygen to the fire, delaying the spread of flame and lowering the radiated heat output.

### **Summary**

Prevention is the best solution!

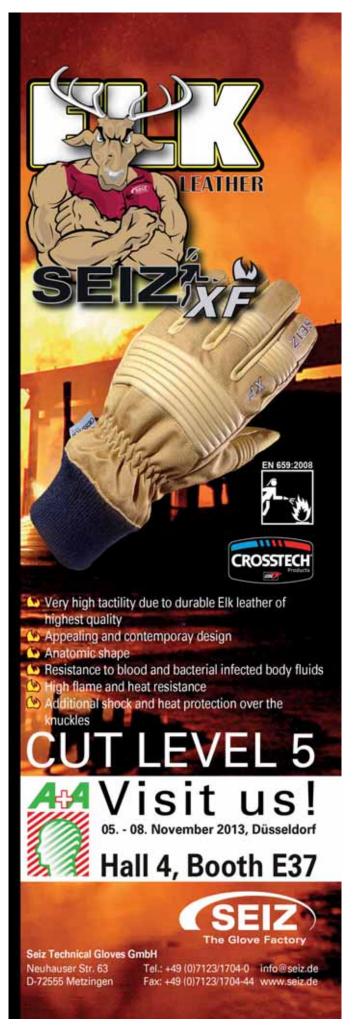
But on the basis that if a fire happens, a fire barrier system will help to reduce the amount of damage and will create a safer working environment for the fire and rescue services.

On behalf of Thatching Advisory Services I have spoken at a number of events and conferences over the years and I strongly believe that better education and awareness is required. We have already assisted a number of organisations by providing technical information and guidance notes for various hand outs.

We are always happy to consider supporting events and assisting with documents if they can be used to raise awareness and help to reduce the risk in the event of a thatch fire.

**Rob Norcott** is a Director at the Thatching Advisory Services

For more information, go to www.thatchingadvisory services.co.uk



# Your people can band you can spen





**Griff Mason** 

You can very likely do a better job of protecting your people from dangerous gases – and you can probably get it done while spending less than you are now. It's an important mission to accomplish. So, let's get started.

irst let's talk about the gases that present the most danger and where they are found.

Carbon Monoxide (CO) is probably the gas we have the longest history of understanding yet we're still learning how dangerous it really is;

- CO poisoning can present with flu like symptoms – or no symptoms at all
- Even mild CO poisoning causes mental confusion which can lead to poor decision making
- Mild CO poisoning robs the heart and brain of oxygen – nearly 50% of US firefighter's line of duty death is attributed to heart disease or stroke

That's why NFPA 1584 rehab standards support the use of CO testing and it's also why so many US fire departments now carry CO detection into every 'first in' response, EMS, overhaul and fire investigation.

There are many dangerous gases that can be present in, around and after a fire. In addition to CO and Cyanides, you can find Sulphur Dioxide,

Oxides of Nitrogen, Hydrogen Chloride, Hydrogen Sulphide, Aldehydes, Benzene, Phosgene and soot. So the question which needs an answer is, 'Are they dangerous? Several are known carcinogens, Phosgene has been used as a chemical warfare agent and all, in sufficient quantities, can cause illness, even death.

EMS encounters with CO and CO poisoning in patients are a bigger problem than we've previously recognised.

- Just one severe CO poisoning almost doubles the risk of premature death
- Repeated exposure to CO may cause long term heart and brain damage
- The American Medical Association thinks we are misdiagnosing by not recognising as many as 100,000 cases of CO poisoning in patients every year in the US alone

The post fire phase can present many dangers as well.

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### e safer d less!

- The common protocol of sweeping once through with a gas monitor to clear the site can miss pockets of dangerous gases
- Some gases are released by heat alone no smoke
- Many of the gases we should be concerned with are 'silent', colorless, odorless and tasteless

Rehabilitation, Fire Command and pump operators can be exposed as well with examples recorded of where there have been no readings on site but 20 metres away dangerous gases have been found and there had not even been any smoke. Carrying gas monitors which detect dangerous gases is the only way to avoid those dangers. Newer technology and innovative applications make it possible to do so while spending less money.

Let's look at an example:

We'll create a moderate sized city that has two fire stations, six engines, two command vehicles and four ambulances. We'll assume it has historically carried a standard four gas monitor in each engine with maintenance and support cost at the average of between \$300 to \$400 per year for each monitor.

Let's also assume a common protocol has been used with the monitors from the engines being carried in when someone suspected they were needed or maybe dispatch had advised of a risk. Possibly it was used for overhaul and maybe by the EMS team if they suspected CO. The weakness in each of these instances is that it counts on training and observation to know when to use the monitor and many of the gases we need to worry about are not visible – we can't see, smell or touch them – and they aren't always where we expect them to be.

In our new approach, let's equip one engine in each station with a four gas monitor. We'll place CO and Lower Explosive Limit (LEL) monitors in each of the other engines and add them to the two command vehicles since carbon monoxide and explosive hydrocarbon gases (gasoline, propane, natural gas, methane, hydrogen, acetylene, benzene, toluene etc.) are the most likely of the gases we'll encounter if we're not in an actual confined space environment. We'll also put CO monitors in each ambulance to passively screen for CO exposure and help diagnose CO poisoning on every EMS response.

Our new protocol will be to carry CO detection into every EMS response. We'll be taking CO and LEL detection into every other operation, including overhaul and fire investigation. We'll count on a core team of trained and well equipped people to respond if entry into a confined space is required or one of our detectors alarms. We'll no longer be depending on training that can do little more than better prepare us to guess when to look for gases we can't see, smell or touch to be safe.



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### CARBON MONOXIDE

Will we be safer? EMS will no longer be exposed to CO they didn't know was there - and they'll be delivering better service since they'll not ever miss CO poisoning in a patient. CO and explosive hydrocarbon gases are the majority of the gases that present danger in emergency response. We'll now be carrying a device that can 'see' them into every call. If we are actively looking for CO and LEL's in every post fire operation, we are very likely to avoid the other dangerous gases that also might be there. CO is one of the more prevalent and cohesive gases, thus it is typically there if any of the others are and is usually one of the last to dissipate. As a bonus, there will now be two command vehicles that can be providing detection on every response and to rapidly respond to calls from CO alarms at homes or other buildings - no need to send an entire engine and crew. Again, offering the ability to be more efficient and deliver better service.

Can using more monitors really cost less? Let's do the math – we added two CO monitors at a cost of \$300 each depending on features and six CO and LEL monitors at \$500 each. We'll keep two of the old four gas monitors. So we've spent around \$3600.00. If we buy solid state detection equipment that doesn't require bump testing support or calibration equipment we've spent all we need to spend. We're saving \$300.00 to \$400.00 per year on the maintenance expense of four of the old four gas monitors so we have \$1200 to \$1600 per year to work with. If we buy solid state equipment that has a five year sensor

life warranty we will have eliminated \$6,000 to \$8,000 in maintenance expense for those old monitors we've replaced over those five years. Our savings = \$2400 to \$4400.00.

It gets even better when we replace the sensors in those solid state devices for \$150.00 and get another five years of warranted sensor life. That's a very nice bottom line savings — more than enough to equip the core response teams with more sophisticated equipment and still bring some to the bottom line.

It's our responsibility to protect those who are on call to respond when we need them. As our knowledge grows, better opportunities are created for us to do that. New technologies can allow us to reduce our costs and our training burden as well. A protocol like our scenario here will allow front line defenders to be safer by carrying equipment that can warn them when they need more support. A small group of responders who are interested in that work are likely to remain well trained and the small group can be well equipped. I've had the pleasure of working with several US fire departments that have introduced protocols like that I've described here and many of them have experienced savings greater than I've used in this example while enhancing the safety of their people significantly. I'm borrowing from their expertise to encourage you to view the safety of your people in a creative and knowledgeable way. Your people can very likely be safer - and you can probably spend less while creating that environment for them

Griff Mason is President and lead salesperson at Airspace Monitoring Systems, Inc. A Milwaukee, WI based company that produces and markets portable solid state dangerous gas monitors.

For more information, go to www.airspaceinc.com





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DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

### ELECTRIC MODELS

Model	HP (	Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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# Hazardous Materi happens next?





**Hayley Hurdle** 

Hazardous material incidents are an almost daily occurrence for fire and rescue services attracting the necessary response required to mitigate the effects to life and the environment.

he emergency phase of hazardous materials incidents is often well documented and recorded through the media although the recovery phase usually receives little attention and the issues involved with this not fully understood. This article reviews the issues faced and the detail required when handling the cleanup of a HAZMAT incident.

### The Scenario

The fire and rescue service has been called to attend an incident involving hazardous materials. They attend, control the situation and make the area safe, but apart from calling the 'agency responsible' for the cleanup operation, do you know how the cleanup is handled and where the material is taken?

### **Chemical Emergencies**

No incident is ever the same and there is not a 'one size fits all' solution to dealing with the HAZMAT scenario as the approach taken will

depend upon the types of chemicals involved as well as the scale of an incident. Typical incidents requiring assistance from a specialist waste management company include, swimming pool chemical reactions, fly tipping of unknown materials, dangerous chemicals leaking from containers, unstable lithium metal battery collections, repacking of damaged chemical drums for suitable road transportation and tanker chemical releases, including residual acid testing.

The fire and rescue service can assist during a chemical emergency and have access to general information and advice on hazardous chemicals and emergency procedures for incidents involving hazardous materials. The National Chemical Emergency Centre (NCEC) plays a key role in national arrangements for responding to chemical incidents and provides a 24 hour national advice service to the public emergency services, known as the Chemsafe line. The fire and rescue service also has roles in site control, on site hazardous materials management, casualty management, population

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### als - what



protection; and environmental impact.

Once an incident has been deemed safe by the emergency services, the incident area will need to be cleaned up by the 'agency responsible'. The clean is the responsibility of the premises holder and if they have hazardous materials on site, they will generally have an approved waste company who can assist, or, point them in the direction of a company who can assist.

### **Dangers**

Hazardous waste, if managed poorly, can cause greater harm to people, property and the environment than non-hazardous waste. Strict controls apply from the point of its production, to its movement, management, and recovery or disposal.

In regards to emergency clean up and fly tipping, the degree of danger associated with an incident is dependent on a variety of factors; including the type of chemical(s) involved, the amount of chemical(s) involved and the environmental conditions (weather, topography, ground type). Each clean up and response is unique, as like every chemical reaction and has to be assessed separately.

Below is an example of an incident that occurred within a Leisure Centre and the approach taken by the specialist waste contractor.

### **Chemical Incident Report**

**Incident:** Chemical reaction at Hotel Swimming Pool requiring clean up, safe packing and subsequent disposal.

Location: Northwest.

**Hazards involved:** Evolution of Chlorine gas (toxic and corrosive), oxidising and acidic solutions, manual handling, basement location (Chlorine gas is 2.5 times heavier than air and tends to flow downhill and pool in lower areas).

**Scenario:** The hotel owners approached a specialist waste contractor informing them of a chemical reaction in the hotel swimming pools 100 litre dosing tank. One of the hotels staff members had reported to have mixed the following:

- 80 litres water
- 20 litres Sodium hypochlorite solution (14-15% free chlorine)
- 2 scoops (approx 1 kilogram) Sodium bisulphate granules

The staff member advised that the reaction 'fizzed' on addition of the sodium bisulphate and released fumes. The operative was overcome by the fumes and was taken to hospital immediately. Subsequently the dosing room filled with fumes, assumed to be chlorine. The pool was closed for the day and the area was vented using a fan and vent. The dosing tank lid was replaced. The fire and rescue service had attended, controlled the situa-

### **HAZARDOUS MATERIALS**



tion and monitored the fumes which had recorded a chlorine level of <0.1 ppm, which was deemed safe for entry. At this point the hotel contracted a specialist waste management company to remove the subsequent wastes and organise disposal.

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### Clean up approach

The task was conducted in three phases:

### Phase 1: Initial Inspection

A site visit was undertaken at the next available opportunity and the situation assessed. Due to the concentration of the solution and the amount of sodium bisulphate added, it was initially thought that the solution would not be evolving chlorine and would be safe to handle and transport safely. Following an inspection of the entry and exit from the transport vehicle to the location of the incident, which turned out to be at ground level and gave the response team manual handling issues. Wearing an acid suit and suitable respiratory equipment, the dosing tank lid was removed and a a pH and starch iodide test completed. The pH could not be taken as the fumes and/or solution bleached the strips, and the starch iodide proved the solution to be oxidising. The chlorine levels inside the container were measured at a level that would cause severe irritation of the eyes, nose, and respiratory tract. At this point the container was closed and discussions took place about the chemical reaction, PPE required and how to approach the clean up.

### Phase 2: Risk assessment, method statement and chemical reactions

From initial inspection, it was agreed that the solution would require mechanically pumping into smaller UN approved containers to solve manual handling issues. It was also decided that there was more chlorine gas evolution than initially thought, leaving specialists to believe that the concentration of sodium hypochlorite present in the solution was greater than that originally informed. If the solution was agitated, it was thought that the reaction could continue, therefore creating additional chlorine gas and increasing the danger to the cleanup crew. It was decided that in order to make the solution safe for transport and stop the evolution of chlorine, ferrous sulphate, a reducing agent, could be used to trap the chlorine gas.

The chemist used their knowledge to work out the chemical reaction that could occur on the addition of the reducing agent:

 $6\ \text{FeSO}_4\ (s) + 3\ \text{Cl}_2\ (g) \ 2\ \text{Fe2}\ (\text{SO}_4)_{3(s)} + 2\ \text{FeCl}_{3(s)}$  This would make the solution acidic and create a precipitate, but deeming it safe for transport to the licence disposal site. **Phase 3: Decanting of Dosing tank and** 

### Phase 3: Decanting of Dosing tank and stabilising of free chlorine

Without the use of laboratories, the graduated chemist took a sample of the dosing tank hypochlorite mixture, and a sample of ferric chloride solution. These samples were then added together in an open area to monitor the potential of any vigorous reaction. No heat was generated; the solution turned brown and created a floc (ferric chloride). The pH was tested, now pH 1, but the solution was still slightly oxidising.

The chemist decided to add the ferrous sulphate to the smaller transporting container rather than the dosing tank as it was in an enclosed area. The vent was open and the fan switched on at all times to prevent build up of chlorine gas. 4×25 litre UN approved containers were used for the solution. In addition, spill pads and booms were used to soak up the remainder of the liquid in both the bund and dosing tank.

Based on the wastes characteristics, generic UN

### HAZARDOUS MATERIALS

numbers were consigned to the waste; labels and paperwork were subsequently once the cleanup was complete. The customer inspected the job and the specialist waste contractor provided aftercare advice. The customer signed off the paperwork and the waste chemical was transported to a licenced transfer and treatment facility.

### What happened to the waste?

When feasibly possible, recycling options are offered to customers which will result in their waste being given an 'R' (Recycling) code, rather than a 'D' (Disposal) code, which would be applied if

sent to routes such as landfill. In accordance with The Waste Regulations (England and Wales) 2011, the Waste Hierarchy gives top priority to preventing waste in the first place. When waste is created, specialist waste management companies give priority to preparing waste for re-use, then recycling, then other recovery such as energy recovery and last of all disposal (for example landfill).

In the example given above, the waste produced from this incident included 100 litres of acid solution, pH 1, and Spill pads contaminated with sodium hypochlorite/water/sodium bisulphate/ferric sulphate solution, pH 1. The solution was

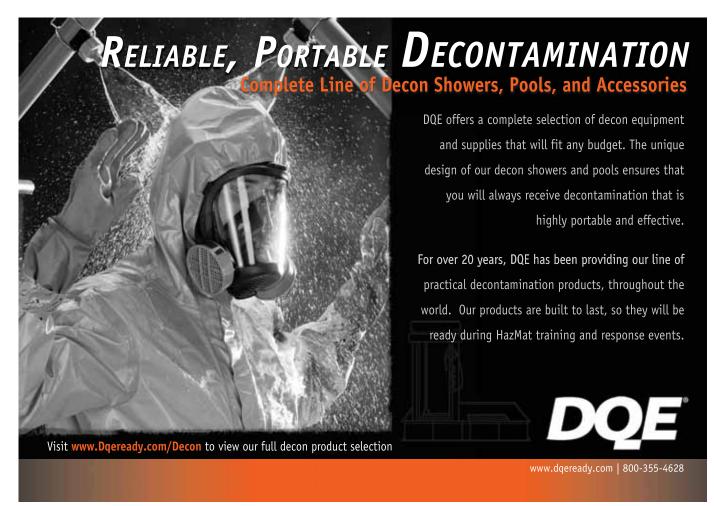


sent for acid neutralisation, creating a filter cake and a neutral solution. The spill pads contaminated with acid can be sent for high temperature incineration, but this is dependent on the chlorine levels.

There are many elements to consider when handling hazardous waste in order to establish the best way of handling the material both environmentally and practically. Hazardous wastes require specialist care in handling, packing and subsequent transportation. Although infrequent, chemical incidents can and do still happen and specialist teams from waste management companies are there to assist when such incidents do occur.

Hayley Hurdle is Technical Manager for Chloros Environmental Ltd – a hazardous waste company based in the UK. The company was established in 2009 and has grown significantly into a team of specialists who operate across the UK with offices in both England and Scotland.

For more information, go to www.chlorosenvironmental. co.uk



## We never know th till the well is dry





**Tony McGuirk** 

The title of this article is a quote by the English historian Thomas Fuller made in the 16th century. For me it symbolises a major change that is taking place in terms of the way in which the more progressive fire and rescue service leaders are using our most precious commodity – water and the reason they are being so innovative – to produce more efficient and effective fire fighting.

The metaphoric well that is running dry represents the changing Government and public attitude to the funding of fire and rescue services. Chief Fire Officers are being challenged like never before to deliver safer communities within a huge cut in the funding available. Since 2010, UK Fire Chiefs have absorbed a cut of in the region of 30% in real budgets and this requires a very different way of doing things. This money cannot be saved by cutting general overheads and has to be met by reducing people but without reducing response times and response effectiveness.

The outcome is that I see a change in the approach of fire chiefs to the technology they invest in and the rationale behind that investment. A good example being the way in which we understand our cheapest and most effective fire fighting media – water, as well as pushing the more innovative suppliers to find ways in which water can be deployed more effectively and efficiently than ever before.

During the latter decades of the last century the

fire industry created a range of additives to water which made it more effective - and more expensive and more profitable. Seduced by impressive performance data, and in a climate of a willingness to commit to this sort of technology, fire leaders invested in different water additives, such as foam, and different ways of applying the new products. The end result has been a massive industry built entirely on increasing the fire fighting capabilities of water, through expensive and often environmentally damaging additives. The majority of the fire market in one way or another is controlled by a small number of large corporations all of whom have factories manufacturing fire fighting chemicals and gases so it is therefore not in their interest to promote water!

The change I have now observed, possibly one of the very few positive outcomes of the attitude of the Government towards our fantastic fire and rescue service, has been an appetite to look again at how we use water in fire fighting – and in my view this changed attitude is a game changing one.

### e worth of water

### Water is so precious

Since the very first fire brigades were formed, the use of water as the primary fire fighting media has been at the heart of our profession. It is generally agreed that the first professional fire service was put in place in AD 6, when the Roman Emperor Augustus levied a 4% tax on the sale of slaves and used the proceeds to set up the new public fire fighting force called the Vigiles. Apparently in Roman times this was known as VAT (Vigiles Added Tax). They were divided into seven cohorts each of 70-80 men commanded by a centurion, and each cohort patrolled two of the city's fourteen administrative regions.

Even then, water was at the heart of their fire fighting strategy and tactics. Every cohort was equipped with a sipho or fire engine, pulled by horses and which consisted of a large double action pump that was partially submerged in a reservoir of water. The Vigiles had an expert in water, called a Siphonarius who operated the pump and an Aquarius who supervised the supply of water.

The role of water additives has also been around as long as professional fire fighting as there is evidence that the Romans used chemical fire fighting by throwing a vinegar based substance called acetum into fires. I agree with the Romans that water additives do have a role and I am not suggesting that there is no future for additives to water, but I am suggesting that we need to look again at how some fire and rescue services are using water in a whole variety of new ways — including cold cutting and highly efficient, highly safe and highly effective fire fighting.

### The new technologies

Emergency services in most parts of the world continue to extinguish fires in the same way that they have done for hundreds of years using huge volumes of water. This is extremely inefficient in the majority of circumstances because huge volumes of water require large, expensive vehicles and equipment, large crews and vast amounts of water (while water remains a shortage worldwide) and the collateral water damage caused by fire fighting is no longer acceptable.

Nearly 326 million trillion gallons of water cover more than 70 per cent of the Earth, making it the most common element on the planet. Water is the only resource found naturally as a solid, liquid and gas. We drink it, swim in it, and our bodies are largely made of it, but there is still much that science doesn't understand about water. For example, unlike almost all other compounds, which typically shrink as they get colder, water expands when it freezes – which is why ice floats on water. Yet even the reasons for this unusual fundamental property remain elusive. New water does not exist naturally; it is recycled, not created. Our water supply today is affected by our ancestors' actions, just as our actions will affect the



water of future generations, because it is all the same. There will never be more or less natural water on Earth than there is today

Understanding water is actually quite a complicated science and it is easy to therefore see why over recent years we have invested more time and energy in the science of fire behaviour, and in the development of fire engineering. Now however some of our progressive leaders are seeing that alongside a thorough understanding of fire engineering and fire behaviour, the professional fire leader of the future must also have a good understanding of water and its future role in the profession of fire fighting. In simple terms just because we have used water for a long time does not mean that we cannot look again at its role in our profession, and perhaps we are now developing the Siphonarius of the 21st century?

The thrust of this changed approach is based around using water more efficiently and extinguishing fires with water mist. Water mist is a highly scientific and specialist way of applying water vapour to extinguish fires quickly, safety and efficiently without the mess and costs of other

### WATERMIST TECHNOLOGY



agents. Water mist has been around for a long time however mist as a fire-fighting agent was never previously very popular due to relatively low technology giving poor fire fighting performance and the introduction of efficient water additives.

However this is now changing rapidly due to the world wanting green and cost effective product, and what could be more cost effective than water? Mist for fire fighting is a true science and involves very high levels of expertise and technology to do it properly. The changing landscape means that visionary fire leaders are looking again at how they use water, through more use of flow meters, and how they deploy water in aggressive fire attack through mist.

The new mist products are very high technology, disruptive and enable a single firefighter to extinguish nearly all types of fires with water safely and efficiently, thereby removing the need for expensive additives and large crews. This approach is also being accompanied with a fresh look at the role of thermal imaging and fire ventilation.

### How does a great mist work?

For a fire to exist it requires oxygen, heat and fuel (known as the fire triangle). Removing any one of these aspects will extinguish or prevent the fire. Effective mist (based on droplet size) is totally unique in its fire fighting technique. It disassembles the entire fire triangle simultaneously in a way which no other agent does.

1 The droplet enters the fire flames (breaking through the convection currents as it does this) and converts to steam. This process has a huge cooling effect due to the massive surface area of mist. 1 litre of mist carries a surface area of

- 240 cubic meters. 1 litre of mist has a cooling effect of 7 kilograms of ice.
- 2 While this cooling process is happening the mist is also converting to steam, and this conversion to steam uses 2257 kilojoules of energy from the fire to convert 1 litre of mist to steam reducing the fire's size and aggression. This process also removes the oxygen from the fire suffocating it.
- The actual burning fuel of any fire is a 'gas like vapour' called free radicals; this gas arrives from a process called pyrolysis (the chemical process where the fuel breaks down due to heat and gives off a vapour, which ignites with the applied heat). The energy of the mist and the cooling removes this vapour effectively neutralizing the fuel and the potential for the fire to grow or spread.

Mist evolved out of water spray systems as defined by NFPA 750 (National Fire Protection Association). According to the NFPA rules, water mist can be defined as any droplet size between 0.1 micron (steam from kettle) and 1000 micron (water from shower) – both of which have completely different fire fighting capability. The most efficient droplet size is around 55-75 microns with gentle kinetic energy at low/medium pressure. This has many benefits as bigger droplets, delivered at high pressure are far too aggressive to be efficient, and they also mean that water is not then suitable for different classes of fire.

Although the NFPA spectrum for droplet size means a whole range of mists can meet the standard, the droplet size is critical to create an enlarged surface area for successful heat exchange (cooling) of the fire. New mist systems at 55-75

#### WATERMIST TECHNOLOGY



microns, delivered at low pressure, means that we are able to extinguish fat/oil and fuel fires with water mist. We can also use these mists on fires with an electrical risk. The fundamental fact of importance is that we do not wet the surface as we are fighting the fire above the surface, and therefore a single attack system is now possible for the majority of fires we respond to creating a much safer system of work for our crews

Creating small droplets below 100 micron at low pressure is very difficult, yet there are now products on evaluation that have achieved this significant breakthrough.

#### Some new concepts

Anyone who visited the recent Glastonbury Music Festival, and/or the UK National Extrication Championships in Liverpool will have seen some of these new technologies being deployed. Greater Manchester Fire and Rescue Service (GMFRS) is perhaps the leading UK fire and rescue services in this area and some if its new technologies were on display at the event in Liverpool.

Although the vehicle has limited water supply, the fire attack capability is comparable to a much bigger and more expensive traditional approach. The cost effective, roadworthy vehicle has a highly effective water mist system capable of dealing with the vast majority of fires GMFRS respond to. The system could easily deal with all vehicle fires (including HGV size vehicles) as well as off road fires which have traditionally been time consuming and expensive to respond to (railway sidings for example).

The FireBug requires a normal licence, has excellent off road capability, and is a good example of this shift towards more efficient and effective use of the available technology. They have also created even more flexibility and capability to use the vehicle in a different community support capacity for snow clearing by having the ability to fit a snow plough and a road gritter hopper skid for the back of the vehicle. The price point for the concept is in the region of a medium family sized car and the result is a highly effective fire fighting tool which deploys the latest and most effective mist technology available, with the flexibility and reliability of brands such as JCB and Briggs & Stratton.

The marrying of purpose designed and market leading specialist technologies delivers a high quality product that is easy to train with and use.

Its simplicity should not undermine its capability and the tool can be used by whole time, retained and even volunteer firefighters alike, across urban, rural and wildland environments – and it's made in the UK!

Another innovative tool being deployed by GMFRS is the BacPac – a powerful, portable fire extinguishing kit, utilising cutting-edge mist technology to extinguish the full spectrum of fires. It is designed to enable rapid response to fire situations, and the system can extinguish A, B, C, D, E & F class fires, it is also safe on electrics up to 35 kilovolts. The system ensures minimal collateral damage, maximum water efficiency, is simple and safe to operate and convenient to recharge.

Staffordshire, Essex and Devon & Somerset Fire and Rescue Services are also interested in the same technologies and other fire and rescue services are looking at other water based technologies such as cold cutting. These concepts are good examples of how progressive leaders and fire and rescue services are looking at how they deploy cost and operationally effective mist systems to help them respond to the many challenges of the future.

I think they are to be congratulated for their courage and vision to revisit the way in which we use our most precious commodity – water – as well as the way in which we deploy into our communities to maximise the value for money of the public spend for which we are accountable.

#### **Summary**

In summary I would conclude by hoping that I have drawn some attention to the innovation that is taking place in the UK Fire and Rescue Service. The move to better understand the role of water in our profession, and a willingness to explore different tactical approaches fills me with optimism that whatever the challenges faced in the future, we still have leaders with the courage of their professional conviction to meet that future head on.

Yes, it can rain a lot in countries like the UK but we waste so much water that our rivers are now at serious risk. One third of the water we take from our natural environment is wasted – and the majority of water we currently use for fire fighting is also wasted. The mist systems now coming on the market with their incredibly small and effective droplet size mean that smaller yet equally effective response is now more possible than ever before. Understanding water is just as important as understanding fire behaviour and fire engineering, and I hope this article has helped some of that understanding.

We never know the worth of water till the well is dry.

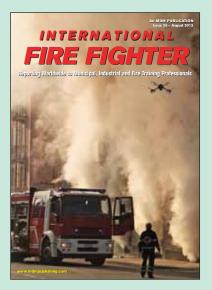
Tony McGuirk retired in late 2012 after a 35 year career, spending the last 10 years as Chief Fire Officer of Merseyside Fire and Rescue Service, UK. He continues his involvement in the fire and rescue world through a number of consultancy projects.

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"The independent alternative"

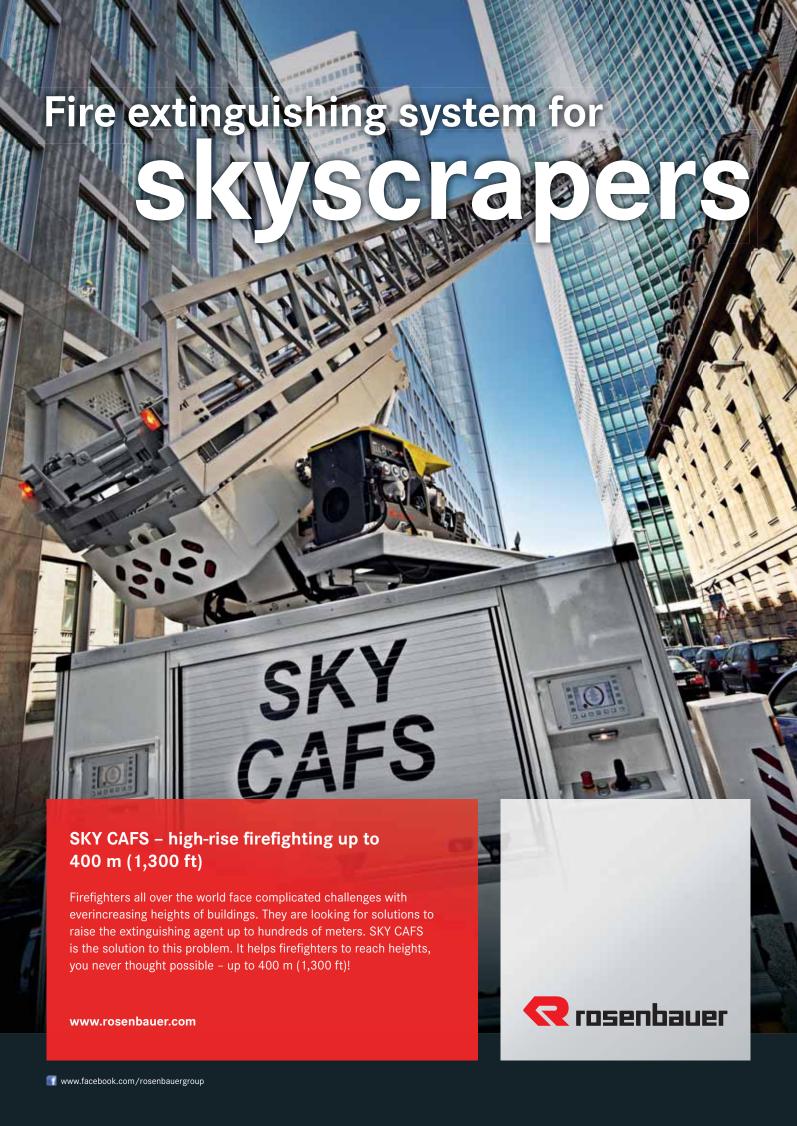
# Foam Concentrates and Foam Systems







Dafo Fomtec AB P.O Box 683 SE-135 26 Tyresö Sweden Phone: +46 8 506 405 66 Fax: +46 8 506 405 29 E-mail: info@fomtec.com Web: www.fomtec.com





#### **G-Force Nozzles: The Inside Story**

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

Serialization provides track-ability and immediate access to on-line operational instructions

Integral Inlet Screen prevents debris from entering nozzle and affecting stream quality

Stainless Steel Slide Valve provides turbulence-free flow control when gated

Color-Coded Polymer Pistol Grip, Valve Handle and Covers offer rugged durability in harsh firefighting conditions mov.tft.com/F5

Your Choice of Fixed,
Swiveling, Threaded, Storz or
Articulating Inlet Coupling



Flush without nozzle shutdown or pattern adjustment

# The NEW GLOBAL FORCE in Nozzles



For a complete list of FM Approved models visit newforce.tft.com.

NFPA #1964 Compliant Integral Tactile Indicator
provides optional preset pattern
selection or factory set lock out

#### Choice of:

- Fixed Metal
- Fixed Molded Rubber
- Spinning Stainless Steel (shown)

#### Choice of:

- Fixed Pressure and Flow
- Selectable Flow with Fixed Pressure, or
- 3 Automatic Pressure and Variable Flow Choices

#### Choice of:

- Tip Only
- Shutoff
- · Shutoff with Grip Models

Bonded Rubber Bumper provides maximum durability in harsh conditions

Large Index Ring with Indicator allows easy flow, pressure or flush selections with a gloved hand

Lightweight Hard Anodized
Aluminum Alloy Body includes
permanent laser engraved
operational markings and
highly visible reflective labeling



**G-Force** 



# Large Diameter Hose SUPER HOSE CARRIER

Handled by single operator!

No power source required!







Easy to load, carry, and extend LDH.





Roll up by Ratchet Handle and unload.

Storage into box by Roller Base



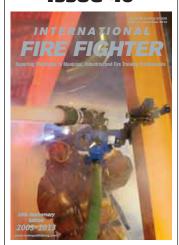
- Carrier's lightweight and compactness make it easier to transport, load, unload LDH and load the carrier onto truck easily.
  - Ratchet-type handle lever helps to roll up LDH so easily.

Model dia (mm) Max length LH-100 100-125 50m LH-150 125-150 40m LH-200 150-250 30m LH-300 250-300 20m



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#### **November 2013** Issue 40



Cover image: Unique to firefighting, the Hemisphere Transportable Monitor provides fire flows anywhere.

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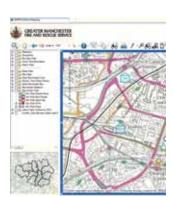
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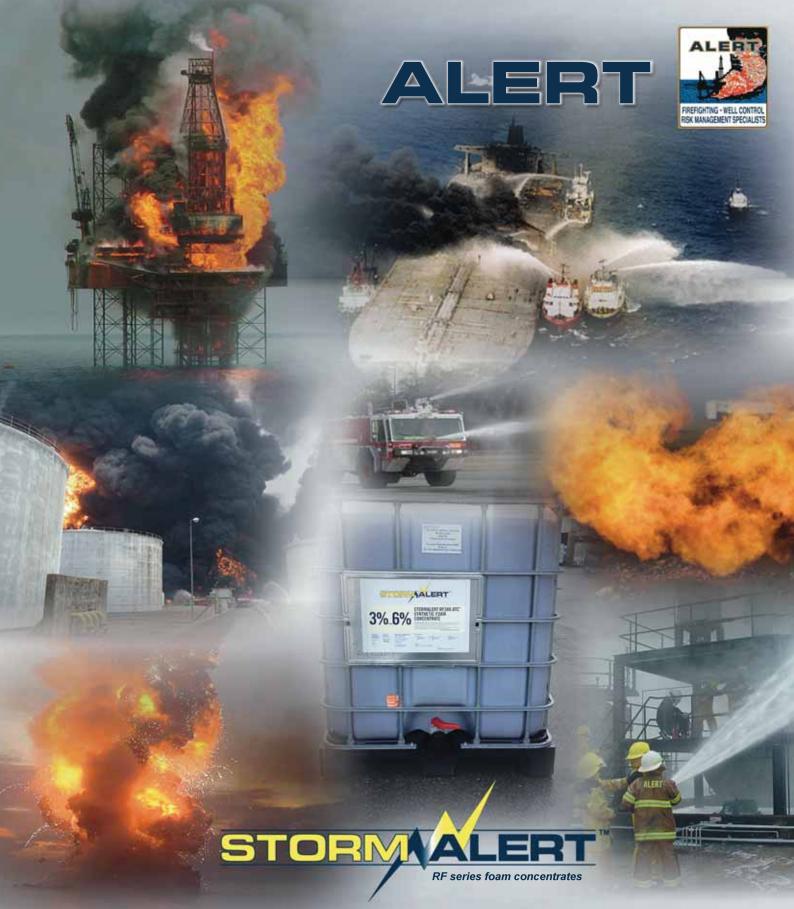


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No longer a myth...simply proven high performance firefighting foam concentrates.

StormALERT™ foam concentrates from ALERT.

Innovative environmentally sustainable fluorosurfactant and fluoropolymer-free firefighting foam with no environmental concerns for persistence, bioaccumulation or toxic breakdown.

StormALERT™ foam concentrates are formulated using a new synthetic foam technology to replace traditional AFFF and AR-AFFF foam concentrates and older fluoroprotein foams.

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Chief William R. Metcalf EFO, CFO, MIFireE

Chief Metcalf is President and Chairman of the Board of the International Association of Fire Chiefs (IAFC). He is Chief of Department at North County Fire Protection District in California, USA.

#### Collaboration is the Cure for What Ails Us

Working together, the fire service can find the solutions to the global challenges we face, including the growing threat of cancer.

ne of the privileges of serving as the President of the International Association of Fire Chiefs (IAFC) is having the opportunity to see and learn about the fire service around the world. I have to confess that prior to serving in this position I thought that the fire service was very different from place to place. I've since learned that we share more in common than I thought. Although our apparatus and uniforms may look different and we may use different languages, many of our issues are the same.

For example, in recent conversations with colleagues from Europe, I have discovered that we share a common problem with nuisance fire alarms. That is, fire alarms that cause a response from the fire department, but are ultimately determined to be caused by something that doesn't require the assistance of the fire department (malfunctioning detector, burned toast, etc).

During our discussion, US fire departments reported that as few as 2 out of 10,000 responses to automated alarms actually require fire department intervention. European departments reported that fewer than two percent of responses to automated alarms are legitimate incidents. We need to work with the alarm industry to improve the reliability of these systems. It's important that we educate the alarm industry about the impact that nuisance alarms have on public safety, firefighter safety, and the effective use of our limited resources.

Recent conversations with Chief Fire Officers from the Pacific Rim revealed that many of their departments are struggling with similar language barriers between responders and the public that we face in the US. As tourism, global businesses and immigration flourish, we all struggle to identify or train multi-lingual personnel which can support more effective service.

The issue of wildland fires and increasing housing development in the wildland-urban interface is clearly another issue many departments are facing. The headlines are often filled with stories of major fires with tragic loss of lives (civilian and firefighter) in Australia, Russia, Europe, Canada, the US and many others.

Those are just three brief examples that illustrate how similar our work is around the world. When we talk about our concerns and read about major incidents in other countries, we see that the problems are often identical to our own. Yet we only do a very limited job of sharing information and building common solutions

We need to search out and take advantage of opportunities to communicate with each other, such as sharing lessons learned, contributing new ideas or discussing new research, especially about things that help us to provide better emergency services and to keep our members safe.

That said, I want to start today by sharing some information about a challenge you may have in your department – a growing number of firefighters diagnosed with cancer. In the US, we have noticed a dramatic increase in the diagnoses of cancer among firefighters.

Here are just a few data-points that have us very worried:

- More firefighters have been diagnosed with cancer in the last two years than in the previous ten years combined.
- Cancer is a leading killer of firefighters under the age of 65.
- Firefighters have up to a 100% higher incidence of certain types of cancer than do the members of the general public.
- Some departments in major metropolitan departments are reporting cancer appearing among their retirees at a rate approaching 100%.
   If we estimate the number of US firefighters
- If we estimate the number of US firefighters dying annually from cancer the numbers approach 700-800 per year.

There is clearly a problem here. Something is going on in our profession – something that is killing our members at unprecedented rates.

The United States Fire Administration is currently funding a major research study to learn more about this issue of cancer in the fire service. It's a study that will look at the health status of 30,000 firefighters, both historically and going forward, with a goal to understand better the connection between the firefighting profession and the terrible disease of cancer. Early results are confirming that there is definitely a significantly increased incidence of cancer in firefighters and is making progress in identifying potential causes, but we have a long way to go.

The Firefighter Cancer Support Network (www.firefightercancersupport.org) has recently released a white paper on the topic that is available on their website. The white paper makes clear several important points:

- 1 We have a problem
- 2 The exact origin or cause of the problem isn't understood
- While research continues to try to identify what is going on and why, there are some interim steps that we can take to make our firefighters more cancer-safe.

The white paper concludes with a single page list of specific action steps that we can take to help to protect ourselves, our department members and other responders from this terrible disease. I encourage fire service leaders to join in the effort to understand this terrible disease and share what we know and understand about its link to firefighting. Please review the white paper and ask yourself if you are doing all that you can to keep yourself and your personnel safe.

Raising awareness about firefighter cancer and creating action to stop its spread is a major goal I have identified for myself during my year as president. I know that there is only so much I can do on my own but I also know many others will join the fight. That's something else we all have in common: no matter where we're from the fire service helps each other when things get tough. If we share more information and work together more often, then I know we'll find the answers we need to create stronger policies, more efficient and effective response, work closer with our communities and even take out cancer.

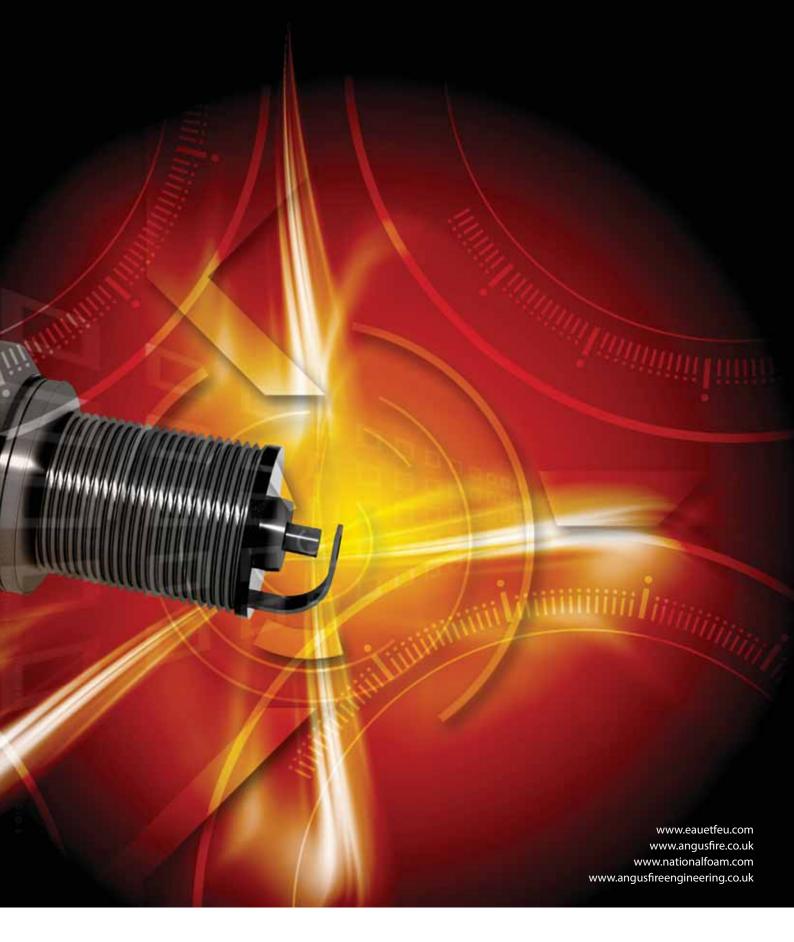


#### www.mdmpublishing.com



There's a new power in global fire fighting. Four major international brands have combined together to offer the most comprehensive range of products and services worldwide. We're fired up to help protect lives, property and assets, and excited about the prospects our new global strength brings to our customers.

UK-based Angus Fire, US-based National Foam and French-based Eau et Feu have a long history of fire fighting innovation and occupy a unique position in the development and manufacture of fire hose, foam concentrates and fire fighting equipment worldwide, whilst Angus Fire Engineering is a leader in the design, build and commissioning of systems worldwide.



Over the past two hundred years, we have achieved many industry 'firsts' and remain at the forefront of environmentally responsible technology through continuous investment in research and development. We supply customers in over one hundred countries. If you are one of them 'thank you'. If not, we look forward to welcoming you into an exciting future together.











#### Take Command of Darkness Fire and Rescue Departments have discovered clearing the darkness from emergency scenes make it much safer and more efficient for your personnel to rescue victims and fight fires. Contact your dealer for a demonstration of all the Command Light products including LED versions to see what you've been missing. www.commandlight.com + 970 -297-7100 3842 Redman Drive Ft. Collins, CO 80524 USA SCAN WITH PHONE TO SEE VIDEO

# Solberg Introduces RE-HEALING Foam Environmental Warranty

The Solberg Company has introduced an environmental warranty for RE-HEALING foam concentrates, the company's innovative high performance fluorine-free firefighting foam.

Solberg will provide a warranty to purchasers of RE-HEALING foam concentrate, that for twenty years after the purchase, whether as part of a foam/water fire protection system or as foam concentrate only, the use of RE-HEALING foam will not be restricted in any way due to the presence of any organohalogens, whether in surfactants, polymers, or any other form.

The environmental warranty also includes the provision that the foam concentrate will not be banned by any governmental entity or regulatory body for any of the following environmental issues:

- No Governmental restrictions related to the presence of fluorine
- No persistence in the environment
- No bioaccumulation
- No PFOS or PFOA
- No biodegradation into PFOS or PFOA Should environmental regulations be enacted after the purchase of the RE-HEALING foam which require removal of the RE-HEALING foam concentrate from the market for one of these environmental issues, Solberg will replace the RE-HEALING foam concentrate with a new foam concentrate that meets such newly enacted environmental regulations.

RE-HEALING foam concentrates are intended for use on Class B hydrocarbon and polar solvent fuel fires. Concentrates available include RF1 (1%), RF3 (3%), RF6 (6%) and RF 3 x 6% ATCTM formulations.

RE-HEALING foam concentrates can be used to prevent reignition of a liquid spill and control hazardous vapors. On Class A fuels, RE-HEALING foam will improve the extinguishment of deep-seated fires.

For more information, go to www.solbergfoam.com

#### NCEC – delivering excellence in chemical emergency response for 40 years

As well as International Fire Fighter, the National Chemical Emergency Centre (NCEC) is also celebrating a 40th anniversary this year! Since 1973, NCEC has provided emergency advice during all types of chemical incident. Our products have set global standards in emergency response, incident preparation and regulatory compliance.

When accidents happen, our world leading 24/7 Chemsafe emergency response helpline and chemical hazard software provide the emergency services with the vital support and guidance they need to manage dangerous situations safely.

#### What is Chemsafe?

Chemsafe is the Chemical Industries Association (CIA) scheme for providing rapid, expert advice and support in the event of an emergency during the distribution of chemical products. It is a voluntary scheme that was set up in 1974 and applies to all products, not just those classified as hazardous. Chemsafe is an integral part of the chemical industry's Responsible Care initiative.

Chemsafe's Level 1 24/7 telephone chemical advice service is run by NCEC, with funding support from the Department for Transport and CIA. As the national centre and a provider of commercial emergency response globally, NCEC has access to a wealth of information that enables us to provide product-specific advice during any chemical incident in the UK. This ensures a rapid, co-ordinated response to help minimise adverse effects to the public, property and environment

Chemsafe is available to all UK emergency services and is free at the point of use. Please contact NCEC (ncec@ricardo-aea.com) if you require the emergency number.

#### **Advice NCEC provides**

NCEC provides advice on:

- Identifying chemicals (including trade name products) and associated hazards (including environmental).
- Identifying a manufacturer or supplier.
- Spillage remediation.
- Reaction chemistry.
- Suitable personal protective equipment.
- First aid
- Sourcing safety information in a non-technical format.

Such advice is invaluable when dealing with an incident and attempting to minimise potential dangers, protect people and the environment, and make the scene safe.

#### **Training and exercises**

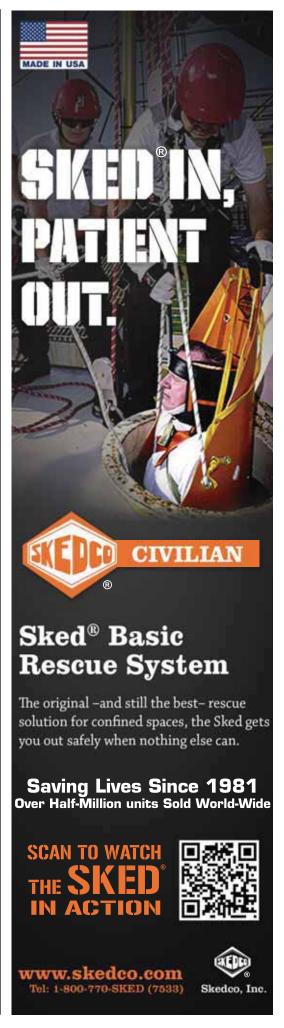
Live-play exercises are one of the best strategies for testing the planned response systems for chemical incidents. NCEC can provide support with any exercise the UK emergency services and other clients may run, either in the planning stage or during the actual exercise. However, we do ask that we are informed in advance of any exercise taking place or, when phoning, that your call is part of an exercise.

Our Chemsafe refresher training course for the emergency services is free of charge (excluding travel expenses). This covers technical training (e.g. chemical fatality incident response), Chemdata familiarisation and general guidance on the Chemsafe service.

#### **NCEC products and services**

NCEC also provides a range of commercial products and services to help with all aspects of chemical risk management including Chemdata, our chemical hazards database; telephone emergency response; training; consultancy; and safety data sheet (SDS) authoring and management.

For more information, go to www.the-ncec.com



# The ESKA CROSSTECH® – an invincible USAR and technical rescue glove

The EU and the rest of the world still do not have a uniform set of regulations on the level of protection gloves must provide if they are designed for use in technical rescue operations. Within Europe, the EN 388 standard states that gloves used in technical rescues where there are no thermal hazards must provide mechanical protection that achieves certain minimum performance levels. But ESKA CROSSTECH  $^{\scriptsize \circledR}$ gloves from glove manufacturer ESKA are raising this bar to a whole new level. As well as complying with EN 388, these gloves have been tested and certified in accordance with EN 407 for resistance to contact heat and to splashes of molten metal. They also achieve performance level 4 in resistance to burning.

The gloves therefore meet or exceed the requirements in every category. The cut protection expands across the entire glove (i.e. includes the back of the hand as well as the palm side), and achieves an outstanding 5 – the highest performance level available. That means there is almost



no chance of anything penetrating through to the lining. The gloves also protect against other dangers that rescuers are likely to encounter.

ESKA CROSSTECH® gloves offer outstanding, lasting protection and excellent dexterity in a hardwearing model that is supremely comfortable.

 Permanent, reliable barrier against blood and bodily fluids (ISO 16604) that rescuers could come into contact with during technical rescues involving, e.g. patients with hepatitis or HIV.

- Resistance to penetration by liquid chemicals (ISO 13994/NFPA 1951)
- Lasting waterproofing even after several soakings / washing cycles
- Breathable fabric to allow moisture to escape
- Flexible, welded seams for an extremely comfortable fit

Rescuers will appreciate the gloves for their outstanding, lasting protection and excellent level of comfort. The ultra-thin, extremely robust CROSSTECH® membrane insert is fully bonded to the glove's inner lining and outer shell. This provides the wearer with much better dexterity and grip (pegboard test/ASTM F2010; NFPA 1951), stops the layers slipping around inside the glove, and – a key factor for all rescuers – makes it easier to get the gloves on and off.

For more information, go to www.eska.at

## DQE introduces the Privacy Cube



Indianapolis based DQE have recently introduced the Privacy Cube to its range of practical products designed to improve the safety and readiness of first responders and the healthcare community.

The Privacy Cube provides needed private space quickly and efficiently and assembles to create a square-shaped area with a variety of

emergency response uses: modesty during decontamination, medical treatment, responder rehab privacy, crime scene isolation, fatality management and more.

The four-panel partition system is lightweight and measures  $62^{\prime\prime} \times 62^{\prime\prime} \times 74^{\prime\prime}$ . It folds flat for easy storage and the screens adjust into multiple configurations beyond a square-shape, and have even greater versatility when used alongside the Privacy Screen.

The Privacy Cube features:

- Easy snap-fit assembly
- Four PVC frames (each measuring 70" H×65" W) surrounded by fluid resistant fabric
- Includes three sandbags for extra stability outdoors or on uneven ground
- Screens are easily replaced when needed with the availability for replacement screen assembly

For more information, go to www.dgeready.com/PrivacyCube

# Scott Safety Wins Thermal Imaging Contracts

Scott Safety has announced new contracts to supply its Eagle Attack thermal imaging cameras (TICs) to Cleveland Fire Brigade and Hereford and Worcester Fire and Rescue Service in the UK. In total, Scott Safety has supplied 250 thermal imaging cameras to 8 fire and rescue services across the UK in the last 18 months, confirming the company's reputation

for manufacturing high specification, quality products.

Both services conducted a fair tender process which involved shortlisted suppliers providing products for physical testing. Fire fighters put the various cameras to the test, awarding merit for ease of use, durability and whether they were fit for purpose. As a result, Cleveland Fire Brigade awarded Scott Safety the tender for 24 TICs.

Following a similar process when cameras were tested against a set of mandatory requirements, Hereford and Worcester Fire and Rescue Service also chose to partner with Scott Safety. With fire fighters particularly heralding its portable size, low cost unit price and ease of use, the Eagle Attack stood out from its competitors and a total of 36 cameras were purchased.

By obtaining valuable input from hundreds of firefighters and listening to their views on design and specifications, Scott Safety has been able to fully develop the Eagle Attack to meet their requirements. The Eagle Attack is a thermal imaging camera that delivers the performance and quality that the emergency services demand.

For further information, go to www.scottsafety.com



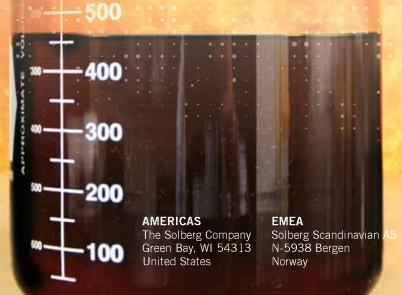


# INTRODUCING RE-HEALING<sup>™</sup> FOAM

## The fire industries' most extensively tested, environmentally-friendly foam concentrate.

- Superior Fire Performance
- Exceptional Burn Back Resistance
- No Special Discharge Devices Required
- UL, EN, ICAO Certified
- Concentrate Types:
   1%, 3%, 6%, 3x6 ATC™

- 100% Fluorosurfactant,
   and Fluoropolymer-Free
- Replaces AFFF, FFFP, Protein and Fluoroprotein Foams
- No Environmental Concerns for Persistence, Bioaccumulation or Toxic Breakdown



ASIA PACIFIC
Solberg Asia Pacific Pty

**Candice Link** 

## Versatility within t Rescue Services fle

A convertible for the sunshine, an estate for the growing family, a 4x4 for off-roading; there is a vehicle suited to every scenario. Unfortunately it is not always feasible to have one vehicle for one need, we all need and expect many things from what we have, this is where versatility becomes a priority – the 4x4 estate with the large sunroof for example.



his principle goes further than just our individual needs, on a large scale such as the fleet for fire and rescue services, it becomes essential that they are versatile to face the many challenges of today's teams; from wildfires through to fires at large music festivals, car fires in fields to chip pan fires in a flat down cobbled street in town.

Many vehicles have been adapted in recent years such as the Rapid Intervention Vehicles (RIV) and many smaller fire trucks successfully introduced to the expanding fleets. However, the main issue with most of these vehicles is the quantity and weight of the water required to extinguish fires, in the traditional manner, outweighs the vehicles ability or the extinguishing

agents (if used) on such vehicles are detrimental to the environment.

Utilising WaterMist technology, JCB and FireBug Company have developed an all terrain, all weather, all fire class compact first response fire vehicle – the RescueMax. This is built upon the unrivalled JCB 1000D WORKMAX and incorporates the FireBug WaterMist technology fire system. The RescueMax is able to tackle the full spectrum of fires, offering an effective, comprehensive response vehicle.

The compact RescueMax provides and environmentally friendly solution and comprehensive fire fighting functionality; removing the massive costs and resources required in deploying a full tender of firefighters to many fires such as bin fires, car fires, field fires and more.

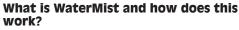
The main advantage of the RescueMax is the modernised and unique WaterMist technology which is mounted onto a skid to offer a modular fire fighting system. The FireBug skid utilises a highly resilient agricultural grade pump and diesel engine combination and a unique, tri-function dispensing gun for foam and water. This creates a powerful, robust, hard working fire fighting system and with only 260 litres of water offers 24 litres/minute fire fighting ability or approximately 15 minutes continuos discharge time.

The key to the success of this vehicle is understanding that this fire fighting solution challenges traditional fire fighting techniques and offers a modernised approach. Once you understand how the technology works, the RescueMax is a preferred vehicle choice for the fire and rescue services' ensuring the safety of the team as well as fire and rescue service budgets.



WaterMist is most advantageous, offering:

- Toxic-free agents for safe fire fighting
- Designed for most fire risks A,B,C,E and F
- Quick and easy to refill and maintain
- Little or no collateral damage after discharge
- Lower life-cycle costs
- 100% environmentally friendly
- No thermal shock or electrical conductivity resulting from discharge
- Totally safe to people and animals



By applying low pressure fine water droplets, known as 'WaterMist' over, around and into the flame, our technology suffocates the fire as the mist converts to steam removing the oxygen, simultaneously reducing the temperature at the source of the fire therefore eliminating the production of flammable gas (free radicals). Having removed the oxygen and cooled the fire, the flames are extinguished.

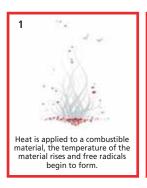
The WaterMist technology generates a consistent droplet size of around 50-75 microns, which equates to an excess of 1,910,828,025 droplets from 1 litre of water giving a surface area of 60 square metres. This provides a large surface area for the successful exchange of energy, approximately 2592 kilojoules/kilogram, which is responsible for the rapid cooling of the fire. This consistent droplet size and kinetic energy is essential to ensure the effective control of Class A fire.

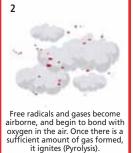
However, we appreciate that foams, gels and wetting agents are necessary in certain applica-

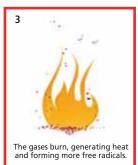




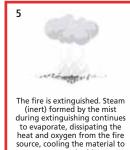
# he Fire and et











prevent re-ignition.

tions and that is why we offer this additional solution to cover all fire scenarios. RescueMax can incorporate a premix or foam induction system to allow the safe and effective use of foam or other liquid agents. Our nozzle allows you to choose between the WaterMist of foam option depending on the type and size of the fire.

#### **Vehicle Options**

The RescueMax is available for road legal use, with kits which include work lights, indicators, fog light, reversing lights, vehicle horn, front and rear lights complete with a rear lighting board with space to attach the vehicle number plate. A road legal kit gives you the ability to travel between incidents without the need for an additional vehicle and trailer.

For protection against the elements various cab options are available. A full hard cab with front screen comes complete with washer and wiper, rear screen and glass doors. There is also a full soft cab, with glass front screen, washer and wiper, rear screen and doors which can be rolled up as and when required or alternatively ordered without doors.

The RescueMax is the machine to get you out of trouble on mud and steep inclines, thanks to a powerful engine which increases torque, full independent suspension and high ground clearance.

JCB have added a front hitch for attachments such as a snow clearing blade or sweeper. These options open up the machine's capability for additional applications by professional users throughout the seasons. In addition, a new full Roll Over Protection System (ROPS) cab option gives extra protection from the elements.

The vehicle handling is improved with an electric power-assist steering option which adapts the response according to the travel speed. When the RescueMax is driving at a very low speed, maximum assist makes steering light and easy, requiring 75% less effort than a non-power-steer machine which makes manoeuvring much easier in tight areas and operator fatigue is reduced. At the maximum speed of 50 mph the power assist is significantly reduced to ensure positive feel and control.

Much of the versatility comes from its key role as a strong load-carrying machine. To develop this capability we have focused on heavy-duty com-

ponentry, such as independent rear trailing arm suspension, the most substantial on the market.

Finally, this machine is built to tackle the toughest ground conditions, again enhancing versatility. The unique design mounts the engine and drivetrain on its own steel 'skid unit' which, apart from being bolted to the main chassis through four vibration-reducing, resilient bushes, acts as a protective underbelly just like armour plate – no other UTV can boast the same.

Vertical and horizontal skid options are available with various tank sizes, as well as medical skids, festival skids and many others in development. Each skid is easily interchangeable.

Recently RescueMax was used by Devon & Somerset Fire and Rescue Service at the World famous Glastonbury Music Festival in addition to the usual fleet employed at such events and provided a dual solution with the vertical 300 litre tank and two 'BacPac' portable fire suppression kits. These allowed smaller fires, which are more predominant at these kind of events, to be tackled on foot in areas where congestion made access difficult.

As the vehicle has 4x4 ability it was a practical vehicle to drive around the terrain, easy to navigate between the 177,500 people who attended and quickly and effectively extinguished the fires. The rapid knock down with minimal water usage provided a practical, easy to use solution suited to this environment.

The horizontal skid has recently been supplied to services such as Greater Manchester Fire and Rescue Service for their wildfire season. The skid was adapted to enable larger storage capacity required by their teams and the vehicle was delivered with snow ploughs attached to the front for use during the winter months, thus providing a multi purpose investment for their Service.

Continued modernisation, primarily driven by cost cutting is leading to more innovative solutions for our fire and rescue services. From the fleet each station will use through to the fire fighting techniques adopted by the personnel, it's apparent that change is happening and versatility of all equipment is essential to meet this.

FireBug St

Candice Link is International Marketing Manager at FireBug Company Ltd.

For further information, go to www.firebuggroup.com

# Charging the opposition – RHYNO Windshield Cutter

The 'RHYNO Windshield Cutter', produced by WE CUT THE GLASS, is a unique battery-powered hand tool used to rapidly remove motor vehicle glass in order to gain access to injured occupants. The windshield, passenger and rear windows can be safely and easily be removed in less than one minute to allow quick access.

With the ever expanding use of laminated glass in all vehicle portals by motor manufacturers the occurrences of patients being discovered in close proximity to it will only increase. Reciprocating saws and axes cannot be safely used where occupants are in located close to the glass for fear of

causing additional injury to the patient.
With a cutter blade protrusion of less than one inch into the occupant compartment, the RHYNO can be used when the patients are

located near the glass. Additional uses include building access or ventilation when cutting residential and urban building safety glass, often referred to as 'hurricane' or 'tornado' glass as well as film-covered or blast-protected glass.

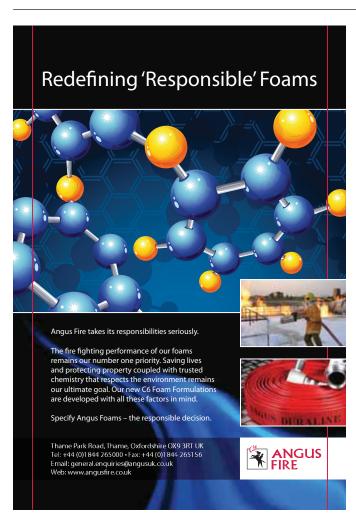
All first responders can utilise the RHYNO including Fire and Rescue Services, Police, Emergency Medical Teams, Bomb Squads and the Military. The tool motor is powered by high ty 14.4V Lithium-ion batteries.

quality 14.4V Lithium-ion batteries.
Between twenty and thirty windscreens can be cut on a single battery charge.
When not in use the battery loses only 0.02V per month approximately.

A set of cutter blades last for at least one hundred windshields and can be easily replaced whilst at an incident in less than two minutes.

A 'RHYNO Windshield Cutter' kit comes complete with the tool, two Lithium-ion batteries, ½ hour 'smart' battery charger, two glass suction cups, a mini-halligan bar – to make purchase, cutter blade spanner and instruction manual, which are all supplied inside a handy cloth carrying bag.

For more information, go to www.wecuttheglass.com





#### **LiftFire®**

Techno Italia Kft (Ltd) started producing hydraulic steering many years ago.

esigner, Luigi Gobbo recalls; 'The idea to develop hydraulic steering comes from the experience I gained from working in my family's factory in Italy after I completed my studies. I remained there until I decided to develop my own products and start my own company, producing high precision mechanical parts for a number of industry applications. The main products were hydraulic components for aircraft and helicopter applications, as well as the automotive industry. In those early years my experience grew and I even offered my services to several hydraulic companies.

I developed several products and patented parts for various applications. With many years of experience, I was now able to develop new technology to produce hydraulic steering systems with high quality processing, which although simple offered high performance.

After twenty years of experience in developing and producing products for hydraulic applications I decided to open my own company to manufacture and market new and innovative product lines.'

Now in addition to hydraulic steering systems we have started the production of the Liftfire®, which is also a hydraulic system and we are continuously working on maintaining our quality.

In the news there are daily reports daily about fire accidents and Mr Gobbo had an idea for developing a product which allowed people to safely escape from a fire.

He carried out research to see if there was such product, but couldn't find any which provided a really safe escape in the event of a fire. There are many products which attempt to stop or minimize the fire, but almost nothing for escaping from a building with the exception of fire stairs which are often difficult to reach. He still remembers the picture of people jumping out of the building without any security system during the tragic events at the World Trade Centre on 9/11. With

this product the number of the victims, there or at any other fire or emergency, could have been decreased. The LiftFire® is a high quality product, absolutely safe and easy to use, which can be deployed without the need for help of another person.

The LiftFire® system can be installed outside of a window or on a balcony. It is fitted with a protective cover which is accessed with an easy-to-use handle. Housed inside there is the hydraulic parts and a wheel with a fire resistant rope and



harness. Also included is a fire protection sheet to use as a full body cover.

The system is very easy and fast to use, simply step into the harness and the rope allows you to descend slowly to ground level. When you arrive at ground level the belt is designed to retract automatically ready for use by any other persons. The LiftFire® is ready to deploy at any time and for infinite numbers of people as there is no need for external energy source.

If the product is fitted to an existing building then from the outside it looks like a nice coloured metal box. When installed during building construction it can be placed into the wall with only the access door being visible.

The LiftFire® is easy to install and where it is installed on a balcony the installation will not require any specialist contractor. Where installation is outside of windows it is recommended that this is undertaken by a specialist contractor.

The company is based in Hungary, from where it is able to supply worldwide. All products are supplied in a kit box containing everything needed to for installation.

The Liftfire<sup>®</sup> is designed for all building types from hotels to private houses.



For more information, go to www.liftfire.com

# Arresting design for PPE Integrated Safety Harness

With an increasing number of fire and rescue services deploying safety harnesses for their firefighters when working at height, Bristol has designed and is launching a complete body safety harness which is fully integrated into structural firefighter garments affording improved wearer comfort in a single garment meeting EN469:2005 Level 2 protection.

Until now, the typical means of providing added safety for firefighters when required to work at height has been the use of an external harness designed to fit over the PPE being worn for the task in hand, requiring the firefighter to don and doff two separate items of clothing. Bristol's innovative design makes for a much more compact solution with fewer harness components exposed to damage or snagging during operations as most of the supporting components are enclosed within, or under, the fabric layers of both coat and trouser.

Available as an option with Bristol's Ergotech Action<sup>TM</sup>, XFlex<sup>TM</sup> and RescueFlex<sup>TM</sup> designs, proprietary harnesses have been carefully integrated into the firefighter clothing after the completion of an extensive in-house design programme and wearer trials.

The seat harness is fitted around the waist of the trouser using a series of belt loops, whilst the leg straps are integrated inside the layers of the trouser with adjustment through Velcro openings either side of the front fly. The harness can be removed and replaced to facilitate cleaning and inspection through an internal horizontal inspection zip at the rear of the trouser, complying with both CE EN 813 and CE EN 358 standards.

Where a chest harness is also required, the fire coat has a special opening on the front to provide access to the central caribiner allowing the chest harness to be attached to the seat harness to offer full fall arrest protection. This is CE certified to the fall arrest standard EN 361 when used with the seat harness. It is also certified to UIAA and EN 12277 chest harness standards

Commenting on the decision to develop and introduce the first integrated safety harness for firefighter and USAR PPE, Roger Startin, Bristol's joint Managing Director said, 'It has been clear for some time that in other parts of Europe, especially Scandinavia and Spain, fall arrest safety harnesses have become widely used by fire and rescue services but that they were looking for an easy-to-use solution to



accommodate the unpredictable nature of many missions. By integrating the harness within the ensemble, a firefighter is instantly able to hook up to a support mechanism deployed to facilitate the wearers high level access to buildings or structures where alternative access routes or methods would be more hazardous. Interest amongst the fire and rescue services across Europe has grown considerably over the past couple of years and we wanted to help them satisfy this emerging requirement with a comprehensive solution which also allows garments to be cleaned, maintained and repaired within existing managed services provision. This is an example of our ongoing commitment to innovative design in emergency services clothing and is yet another product of our new product development programme.'

For more information, go to www.bristoluniforms.com

#### Power redefined

The new SP 53 BS Spreader from WEBER RESCUE SYSTEMS is an absolute breakthrough. More power, bigger range and less weight!

With 53 kN minimum spreading force at the tips, large opening of 800 mm and only 20 kg weight, this spreader easily meets the highest requirements of the EN/NFPA standards.

Plus, as usual, some little special features like further improved tips with studs for even better grip and captive pins.

The new SP 53 BS is classified in category BS 53/800-20 and is the only BS spreader in this weight category.

The slim construction enables easy handling and is ideally suited to today's automotive materials and demands! Its arms and the cylinder body are made of aluminum alloy, which is also used in aircraft manufacturing and which is extremely lightweight.

#### Technical data:

Spreading force\* in working range 53-421 kN
Closing force\* 100 kN
Spreading distance 800 mm
Weight 20.3 kg
EN class BS 53/800-20
Part no. 1058125

\*according to EN 13204 to 700 bar

For more information, go to www.weber-rescue.com







# The world's smallest high resolution thermal imaging camera

#### Specifically designed for firefighters

Introducing the world's smallest, lightweight, high resolution thermal imaging camera - the Argus Mi-TIC.

- · Offers crystal-clear image quality
- · Extremely lightweight and robust
- · Direct Temperature Measurement (DTM)
- · Advanced 320 x 240 or 160 x 120 uncooled sensor
- · Super-fast start up time
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- Multiple wear options
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To view the full range of thermal imaging products, visit argusdirect.com

# Seeing things globally

The management teams at Angus Fire (UK), National Foam (US) and Eau et Feu (France), the world's leading manufacturers of fire fighting products and technology, have completed a £62 million buyout, backed by mid-market private equity investor LDC, as they look to capitalise on growing global demand for their products within the Oil and Gas, Power, Agriculture, Mining, Military, Aviation, Marine and Fire Fighting sectors.



he new group designs and manufactures fire hoses, industrial hoses, foam concentrates, engineered products and engineered fire fighting systems. These high spec and often mission critical products are supplied to national, international and global organisations in over 150 countries with its largest markets in the Europe, Middle East, Asia Pacific and North American regions.

Angus Fire, which has been established for over 200 years, operates its production facility in Bentham, near Lancaster, and its Angus Fire Engineering team, undertaking fire fighting systems design and project management activities is located in Thame, Oxfordshire, and combined they have over 250 employees.

National Foam, which serves both North and South American markets, manufactures foam concentrates in West Chester, Pennsylvania, both fire and industrial hoses in Angier, North Carolina, and designs large capacity fire fighting monitor systems in Exton, Pennsylvania and has almost 100 employees across all 3 sites.

Eau et Feu, with its production operation based in Reims, France has almost 90 employees, manufacturing fire hoses and foam concentrates for its domestic French fire services, while also exporting its products to French-speaking markets within North Africa and Eastern Europe.

Paul Williams, CEO of the new Business, said: 'LDC's investment provides the financial and strategic support to help us capitalise on the increased demand in emerging markets and the buoyant markets in which we sell our products globally. We look forward to creating a unified proposition and cementing the business' marketleading position through investment in new plant and equipment, together with operational improvements to increase our manufacturing capacity. All this will enable us to serve market demand more effectively.'

For further information, go to www.angusfire.co.uk













# Your dedication saves lives.

MSA protects yours.



**Because your Safety is our priority,** MSA introduces the new Gallet F1 XF Fire Helmet: innovative built-in lighting for enhanced visibility, eye protection with dual adjustment system for universal fit, new headband and chinstrap design for superior comfort, unique modularity for easier care and maintenance... **Trust. Durability. Gallet F1 XF.** 



For more information visit our website

Find out more... www.MSAsafety.com/f1xf

Because every life has a purpose...

#### Merseyside FRS Carbon Monoxide Campaign

Merseyside Fire and Rescue Service (MFRS) and Coventry City Council (CCC) have worked collaboratively to reduce preventable deaths through active monitoring of carbon monoxide (CO) levels in properties in the cities of Liverpool and Coventry – commencing the project in late 2009 and concluding in the spring of 2012.

The aim of the collaboration was to measure the extent of possible long term, low level CO exposure in Liverpool and Coventry city areas and look for trends and patterns that would identify any particular demographic that may be a higher risk to potential CO poisoning.

There were two key deliverables from the joint partnership of MFRS and CCC incorporating West Midlands Fire and Rescue Service (WMFRS).

- An academic correlative research study directly between the Cities of Liverpool and Coventry with an estimated reach of some 35,000-40,000 homes and people.
- The development of a sub regional social marketing campaign.
   Toxi RAE 3 gas monitoring devices which detect CO levels in households were distributed to operational frontline fire



crews within the Cities of Liverpool and Coventry (CCC developed a partnership with WMFRS to enable this to happen). As part of the Home Fire Safety Check (HFSC); crews gathered further vital data and took a CO reading as well as identifying other health inequalities issues; they have also been allocated to the Fire Support Network (volunteer arm) to read CO levels in premises they visit. Once the readings of CO were captured the data sets would be inputted into a SharePoint site which had been set up between MFRS, CCC and

Liverpool John Moore's University (JMU). The site enabled the key data sets to be electronically sent to JMU for further analysis.

MFRS and CCC, produced a carbon monoxide leaflet that were distributed across the two cities during HFSCs, the leaflets provide information on CO omissions and referral processes if there is a high CO reading in the premises, this leaflet has been fully endorsed by key stakeholders Gas Safety Register and CO Awareness. During CO awareness week, MFRS and CCC had the opportunity to present the project to the House of Lords in conjunction with other

national CO charities. The presentation highlighted the ongoing work in which CCC, MFRS and WMFRS with a full dissemination event held in Liverpool in May 2012.

During the implementation and development of 'Reducing Preventable Deaths' there have been many success stories which demonstrated the importance of this project. Other key stakeholders have also been able to draw together valuable data that will offer completeness to the study such as numbers of registered engineers in targets areas, any enforcement issues, RIDDOR reportable events, again drawing upon comparisons from across the UK and Europe. Continuous development of partnership working with external agencies including Gas Safety Register, Private and Registered Social Landlords Forums, CO Awareness, Warwickshire University, HSE, COGDEM and the HPA. The project was highly recommended by the All Party Parliamentary Gas Safety Group (APPGSG).

Other outcomes were:

- Reduced number of deaths from Carbon monoxide
- Reduced number of people poisoned as a result of CO poisoning
- Increased number of homes with CO monitors
- Significant reduction in the number of people attending A &E and GP surgeries as a result of CO poisoning.
- Introduction of a referral pathway when faulty boilers (or other appliance) have been located.

Throughout the same period and since we have also supported the Gas Safe Register's Northwest Campaign and had a number of Merseyside Fire Appliances branded up with this vital safety message.

For more information, go to www.merseyfire.gov.uk

#### **Blueproof protection**



A revolutionary fire protection device which uses water in domestic radiators to help suppress fires is on course to be launched around Christmas 2013.

BLUEPROOF is a small, plastic device which is fitted to the top of radiators.

It automatically detects any fire which breaks out, and self targets the flames with steam generated from the radiator's water.

The inventor of Blueproof, Chemical Engineer David Atkinson, was inspired after the tragic deaths of six children in Derby, England in 2012.

'Sprinkler design had not really progressed since their invention 200 years ago. With all the new materials now available, I was determined to design a sprinkler head that would protect every home and child' commented Atkinson.

Test results so far, with regard to its ability to withstand both pressure and still fail open at the required temperature, have exceeded all expectations.

Nottinghamshire Fire and Rescue Service, England is planning to install Blueproof devices in key 'vulnerable' properties once all the official test procedures are complete.

David Atkinson recently addressed the Federation of the European Union (FEU) in Antwerp and said, 'Underestimating the stunning results we have achieved cannot pale into insignificance, this device will save both members of the public and firefighters.'

For more information, go to www.bluerad.co.uk

# Fire service inspires the development of a new product at MEIKO

Cleaning respirator masks is a costly and complex business – but now the job can be done by machine instead of by hand.

echnology transfer is the process of transforming the results of university research into marketplace innovations, while crowdsourcing is about tapping into the collective intelligence of people who work on Webbased projects such as Wikipedia in their free time. What Ralf Wieseke and Frank Hoffmann agreed on when they decided to work together almost seems a little old-fashioned in comparison – a down-to-earth partnership. Wieseke is the equipment supervisor and head of respiratory protection systems at Lahr Fire Service in Germany's Black Forest, while Hoffmann is a sales manager at the mechanical engineering company MEIKO based in Offenburg, Germany. The two men have been

working together for nearly two years on a machine that has made Wieseke's job considerably easier. Together they developed TopClean M, a cleaning and disinfection machine for respirator masks. When the fire crew return to the station after a call-out, Wieseke places his colleagues' respirators in the TopClean M where they are reprocessed to make them hygienically clean and ready to return to the equipment store.

'The strict regulations on cleaning and disinfecting respirator masks have never left us much leeway for experimenting,' says Wieseke. But after a meeting with Frank Hoffmann it was clear that the time had come to find a new way of cleaning respirator masks. 'It's the kind of product innovation that probably doesn't come along very often, but those are the things we like to nurture at MEIKO because we're always trying to stick as closely as we can to market requirements,' says Markus Braun, a MEIKO representative responsible for sales of the company's cleaning and disinfection machines.

MEIKO employs over 1100 staff and is a global player in the field of medical devices. Hospitals and care facilities all over the world use MEIKO technology to clean and disinfect care utensils (urine bottles, kidney bowls, bed pans). 'That wealth of experience proved to be a big help in developing this new machine for fire departments,' says Hoffmann.

For Ralf Wieseke, the days of colleagues coming back from a call-out involving the use of respirators with black marks around the edges of their



faces are finally over. That was always a clear sign that the masks had spent too long in the disinfection tank and the softeners in the masks' rubber components had started to dissolve. The respiratory protection equipment from thirteen volunteer fire departments, three factory fire departments and a number of companies based in Ortenau - a total of some 2,000 pieces of equipment a year - is all reprocessed at Lahr Fire Service's equipment workshop. After major call-outs the workshop sometimes has to cope with cleaning 130 sets of respiratory protection equipment at once. 'Before we installed the MEIKO machine that job would have taken us around one week. Now we get it done in just 60% of the time,' Wieseke says contentedly.

'It's certainly not every day that you get a manufacturer working so closely with a customer and placing so much emphasis on a customer's needs,' says Thomas Happersberger, Station Commander of the Lahr Five Service. As Ralf Wieseke's supervisor, he shares his concerns about firefighter safety but he also has to keep a close eye on the cost of all the service's internal processes. 'If the time it takes to reprocess our respiratory protection equipment is too long, that means we have to keep more equipment in stock to create a buffer in case we get multiple call-outs in quick succession. That ties up capital which we could make better use of in other ways.' But as the Fire Service Commander, his number one priority remains clear - 'The safety of our firefighters is

#### Kut Kwick BrushMaster

The Kut Kwick BrushMaster and its air conditioned brother, the FireMaster, are the ideal machines for producing an environmentally friendly Wildland Urban Interface.



hese true zero-turn-radius forest clearing mowers cut down all vegetation up to 4" in diameter. The BrushMaster's rotary cutters mulch this vegetation to small cuttings that are laid flat on the ground. Trees that are smaller than 4" in diameter are also cut down. The tree limbs are cut off and chopped into pieces. The broken pieces of the trunks of the trees are left laying flat on the ground

Deterioration of the clippings occurs over the following weeks and during subsequent months they fertilize the ground inviting new growth that supports deer and other grazing animals. The removal of the brush allows birds to get to the ground to feed. The most interesting phenomenon is that deer and other wildlife remain in the immediate vicinity of the machine while it is clearing. As soon as the operator gets out of the machine, the wildlife scrambles away. The machine is truly environmentally friendly. The root structure of plants is not disturbed. The healthy root structure prevents erosion and ensures that animals and fowl can successfully feed in the future. The returning new growth does not support fire for at least one year. It is recommended that the new growth be removed annually both for beautification and to maintain an effective fuel break that will stop forest fires.



Brush fires are stopped by Kut Kwick's Brush-Master by producing 'fuel breaks'. When set on fire, the dense brush in the woodlands draws air into the fire supporting very hot blazes that extend up as high as twenty feet into the tree canopy. The extreme heat from the brush fires ignite the canopy producing wind born fire embers called 'fire brands' that ignite new fuel as far as one mile away with a 40 mph wind. The small cuttings cannot blaze up because the oxygen necessary for combustion does not penetrate the clippings that are flat on the ground. The oxygen deprived clippings do not blaze up nor produce a hot fire.

When a raging brush fire reaches the fuel break, the fire drops to the ground where it transverses slowly with a low flame, smolders, or goes out. In any case, a firefighter can easily extinguish any remaining flames with a beater, water, or with other means. The canopy does not catch fire over a fuel break. The greatest protection from wind blown 'fire brands' is to utilise the BrushMaster machines all year long producing 'fuel breaks' 1/4 mile of increased depth. With enough wind, the blown 'fire brands' (embers) from burning tree canopies can jump a fire break as well as any fuel break/fire break combination. The greater the depth of the fuel break, the greater the distance the fire must jump. A BrushMaster machine will produce a fuel break of 1¼ acre or 1¼ miles long and 7' wide in one hour.

These machines can replace hundreds of firefighters who are attempting to do brush removal by hand. The time and cost savings are tremendous. Actual performance records from typical southern forest lands confirm that in one hour a single BrushMaster can do the brush removal that it would take one hundred firefighters to do in one hour. A person can only clear 400 sq. ft. of normal forest land in one hour.

The only process of stopping and controlling forest fires that compares to the BrushMaster produced 'fuel break' in cost as well as effectiveness is the backburn produced 'fire break'. The backburn process costs are normally considered to be slightly less to produce than the mowed 'fuel break'. However, the cost of the backburn produced 'fire break' is substantially higher than the mowed fuel break if all the costs that are always incurred during and after back burning are considered. Some of the costs occurred after the burn include:

Hot spots – Personnel must remain on hand for extended periods after a backburn to eliminate 'hot spots'. Tree stumps, roots, buried limbs, and peat deposits flame up and rekindle forest fires long after a backburn is completed.

Out of control backburn – A substantial amount of personnel and equipment must be kept readily available and often on hand to deal with changes in wind direction and wind velocity that frequently turn backburns into out of control forest fires.

Smoke – Wind directional changes can take smoke from any backburn and send it over populated areas and highways causing visibility, fogs, and public health problems. Personnel and equipment must be on hand to stop the backburn when this occurs.

The ash produced by fire is not as beneficial to the fertilization of the forest land as is the deteriorated biomass produced from the BrushMaster's unique mowing style. The smoke is undesirable and unhealthy for the public. When smoke is embedded in a fog bank, it makes the fog visually impenetrable. Frequently, massive automobile wrecks occur because of the smoke intensified fog banks. The courts have ruled that the party producing the fire is at fault and that these fires are no longer considered 'Acts of God'.

There are many applications where backburns may be used but the Wildland Urban Interface is not one of them. Dealing with the Wildland Urban Interface problem, brush removal for 'fuel breaks' is the way of the future in protecting homes, buildings, and facilities from the threat of forest fires. The forest is a wonderful place for people. When the brush is removed and subsequently maintained, the appreciation expressed by the public to those who have protected them and improved the beautification of their forest lands is overwhelming.

When you realise that mechanical cutting does not carry with it any of the problems associated with the use of chemicals, or the dangers of prescribed burning, it is clearly the choice for fire wise mitigation, especially in the Wildland Urban Interface.'

For more information, go to www.kutkwik.com

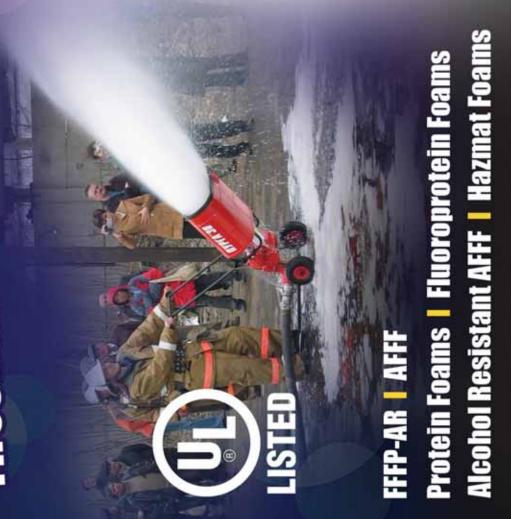


# FIRE SAFETY DEVICES PVT LTD

(ISO 9001 CERTIFIED COMP ANY) Mastering the chemistry behind fire extinguishing.



# Firechem Foams



# FireChem Force



**Norld's Most Powerful Extinguishing Media** Lowest Application Density: 0.40 Kg/m Dry Chemical Powder for High Risk Class B Fires Potassium Bi-Carbonate Urea Reaction ComplexI



#### **EXTRICATION FOCUS**



# Glass management and sharp end protection



Steve Barrow

The importance of an effective casualty centred rescue can not be overstated, indeed it is one of the fundamental principles taught to rescuers. Although safety of the casualty is a priority, this should also be balanced with the safety of the rescuers with the Incident Commander giving careful consideration to all hazards present at the scene during his dynamic risk assessment. This will allow for an extrication plan to be implemented which is casualty focussed but ensures the safety of everyone at the scene of operations.

By undertaking effective post incident discussions (hot debrief) and devising realistic training scenarios ensures that we are able to pre-plan to deal with the generic hazards encountered at road traffic collisions (RTC). Broken glass and sharp edges are just two of these common hazards and the management of them go hand in hand.

On arrival at the scene it is usual to encounter broken glass and mangled metal created during the initial crash which will need to be taken into consideration as part of the initial hazard assessment and immediate control measures instigated where necessary. Once the vehicle and casualty has been stabilised the glass management phase can commence.

#### **Glass Management**

Glass remains a constant hazard throughout the extrication process to both rescuers and casualties and should therefore feature in the Incident Commander's regular reassessment of the hazards.

Extreme care should be taken during the glass management phase to minimise the effects of this operation on the casualty and rescuer. Suitable controls should be implemented to:

- minimise the possibility of glass entering open wounds and causing infection or blood clotting;
- control noise trauma caused due to uncontrolled breakage of glass
- provision of adequate respiratory protection in relation to airborne glass particles
- prevent contamination and injury from shards/splinters/stars of glass

The aim of glass management is to ensure that any hazards are dealt with in an effective manner by utilising the appropriate techniques in an efficient manner to achieve a controlled removal of the glass or by implementing another appropriate control measure which deals with the issue.

We are always looking to reduce the time taken to extricate the casualty and by undertaking simultaneous activity will allow valuable time to be

#### **EXTRICATION FOCUS**

saved during the all important 'golden hour'. The following tasks should also be carried out during the glass management phase:

- Seat belts cut
- Window and door seals removed
- Pillar exposure techniques employed

Two types of vehicle glass commonly encountered at RTC are 'toughened' and 'laminated'. By examining the glass it is possible to identify the manufacturers standard markings which can often assist in ascertaining the type of glass which will therefore allow the correct glass management technique to be undertaken. Identifying glass on foreign vehicles is often unclear making successful identification problematic. Where it is unclear of which type of glass is in use, the appropriate control measures should be put in place and a small area of glass tested using an appropriate tool.

#### **Toughened Glass**

Toughened glass is also often referred to as tempered glass and is found in windscreens, rear screens and side windows of older cars. When broken, toughened glass breaks into thousands of small pieces, often referred to as 'stars', that generally cling together producing a frosted effect.

#### **Laminated Glass**

Laminated glass is now commonplace in modern cars and found in windscreens, rear screens and side windows. It consists of a vulcanised plastic layer sandwiched between two layers of glass and is designed so that when broken the plastic layer holds the glass together in long sharp shards. Laminated glass can be either bonded or non bonded in modern vehicles — we will look at bonded windscreens later.

#### **Glass Removal**

When removing any type of glass hard protection (tear drop or similar) must always be deployed and be butted up to the site of breakage. Secondary soft protection (plastic or cotton sheeting) must also be used to provide additional protection to the casualty and carer.

If the extrication plan requires the front and/or rear screen to be removed as part of the eventual roof removal process, non bonded screens can be removed using the appropriate tools and sheets, however bonded screens will require the glass to be cut.

#### **Removing bonded screens**

Prior to commencing any part of the removal process ensure suitable hard and soft protection has been put in place. Cut the screen across its width keeping as close to the dashboard/parcel shelf as the cutting tool allows. This task can be undertaken by using either a keech tool, thatching shears, general purpose hand saw, reciprocating saw or or a large axe (especially useful when the vehicle is on its side).

Care should be taken when cutting the glass as aggressive cuts can create very fine glass particles and shards. These particles and shards should be controlled by utilising a salvage sheet or similar product. Respiratory protection must be provided to all persons working in the two metre zone.

Where laminated screens and non mechanical quarter lights are not going to be removed as part of the extrication process, it is acceptable to cover/tape them up and leave as part of the struc-

ture of the vehicle. Whenever possible laminated mechanical side/sunroof windows should be wound down into the door or roof skin and taped or covered. Laminated tailgate screens should be covered with a specially designed pouch or standard salvage sheet and treated as part of the car's structure. Doors and tailgates are normally removed as part of extrication process to create as much space as possible.

When compared to toughened glass, laminated glass is known not to be as explosive when it breaks. The verbal warning of 'cutting' will be sufficient to cover the cracking of the glass and when undertaking the cutting/spreading of parts of the car.

#### **Sharp end protection**

The safety our crews, other agencies and any casualties involved is paramount at any rescue scene. To complete any space creation to assist with a casualty centred rescue, it will be necessary to cut glass and metal sections which will undoubtedly result in sharp and jagged edges.

Rescue teams must deal with these localised hazards as they occur during the extrication process and most commonly, material sheets are used. These come in various shapes and sizes, from a basic canvas up to a top of the range Kevlar products. For sharp metals left after a door post has been cut, a purpose made 'post protector' is the ideal solution.

These sheets can be held in place by integral magnets, velcro straps or a very simple idea of utilising plastic rings made from various sizes of drain pipe.

Additional protection can be provided to both the casualty and carer by utilising a light weight sheet which is placed directly over the casualty/carer. A transparent sheet or one with a transparent window is ideal as this allows the casualty/carer to maintain a two way awareness and minimises the feeling of claustrophobia.

Material sheets can be suspended inside the passenger compartment of the vehicle to minimise contamination and also provide good soft protection should a projectile hazard be created during cutting operations.

#### **Product Focus**

For years rescuers have had to 'make do' with ad hoc pieces of 'homemade' equipment when dealing with sharp end hazards and often deployed equipment for purposes which they are not intended. Great examples of this are the use of a large axe to break glass and a floorboard saw to cut a windscreen. Thankfully through effective dialogue and the extensive work being undertaken globally by groups such as the United Kingdom Rescue Organisation (UKRO) and World Rescue Organisation (WRO) manufacturers and rescuers are actually talking to each other. This has resulted in the creation of products which will be used by rescuers because they have been developed by rescuers.

In this section we look at a number of products which have been developed to assist in the processes of glass management and sharp end protection.

**Packexe** are based in Exeter, UK. They have developed a number of products designed to assist rescuers when dealing with common hazards encountered at road traffic collisions This has been achieved by working with extrication professionals from across the world to perfect products that are





#### We Cut The Glass, LLC.

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#### **EXTRICATION FOCUS**

'fit for purpose' and not just moved from one market place to another without refinement.

#### 'Smash' - Glass Management System

Many of us will have dabbled with parcel or duct tape, expensive small squares of exotic film and ill fitting polythene or canvas bags whilst trying to find the perfect solution for glass management.

Packexe have created 'Smash' which is a glass management system that enhances the health and safety of rescuers and casualties. The system consists of fifty metres of ultra adhesive film that is applied using the 'Smash' roller applicator. The film is perforated at 200 mm intervals and with a simple twist of the applicator can be made to fit all window sizes. It is easy to use and takes very little use to master the technique required to achieve the necessary results.

At road traffic collisions, the film can be used to compliment traditional glass management techniques by holding glass particles together on window sections that are to be broken during the extrication. Any glass that is deemed to be intact and not part of any extrication plan can be filmed over to give enhanced scene safety.

'Smash' is proving extremely effective when there is a need to cut a bonded windscreen. By applying the film on the inside of the windscreen a membrane is created which captures flying glass particles and dust. This ensures that contamination inside the passenger compartment of the vehicle is kept to a minimum. Additionally, by applying two layers of 'Smash' to the outside of the windscreen prior to cutting across the bottom drastically reduces the amount of airborne contamination.

'Smash' performs well in wet weather conditions which is always an advantage. It is a simple and straightforward system that requires little maintenance and in addition to the applicator is supplied with a craft knife, squeegee and small towel – all delivered in a neat purpose made carrying bag.

#### 'Sharps Wrap' - Sharp End Protection

Packexe have developed a disposable tape with its own hand held dispenser to cover the sharps hazards encountered at road traffic collisions. The tape can be used to protect sharp edges caused during the collision or by created during the extrication. 'Sharps Wrap' is disposable and can be left in place at the end of the extrication to provide protection to persons or agencies dealing with the vehicle recovery after the rescue services have left the scene.

The tape is easy to apply and the bright yellow colour makes for easy identification of the hazard area. For sharp pointed hazards, a small pillow can be created by going backwards and forwards with the dispenser six or seven times and then encapsulating the pillow with a couple of turns using the dispenser.

'Sharps Wrap' can be used as a stand alone control measure or to hold a traditional post protector in place. This is extremely effective when dealing with exposed posts that are upside down. It has not been developed to replace traditional methods of sharp end protection but to provide rescuers with 'another tool in the box'.

For further information, go to www.packexe.co.uk

#### **Glas-Master from Wehr Engineering**

Glas-Master is a revolutionary manually operated, self-supported glass removal tool which uses no electricity or hydraulics allowing it to be deployed

extremely quickly therefore enhancing the casualties chances of survival.

The Glas-Master has been developed to expedite the removal of all types of vehicle glass, reducing the risk of trauma to the casualty. The versatility of the tool allows for it to be used on fibreglass, wood, plaster etc. The Glas-Master can also be used for rescues from vehicles submerged in water as it is not reliant on any form of external power, apart from the rescuer.

It incorporates four tools into its T-handle design; a tyre valve stem puller, a prying tool, a window punch for side windows and a spike end to penetrate the windshields for saw insertion. A newly designed blade provides a smoother cut and reduces fragmentation of the windscreen glass by 33% over the conventional blade.

For further information, go to www.glasmaster.com

#### **Rhyno Windshield Cutter**

Produced by US based company We Cut The Glass, the RHYNO Windshield Cutter is a unique batterypowered hand tool used to rapidly remove motor vehicle glass to gain access to injured occupants.

Windscreens, passenger and rear windows can be safely and easily removed in less than one minute for quick access. With the ever increasing use of laminated glass in all vehicle portals, more patients will be found to be located in close proximity to it. The use of traditional reciprocating saws and large axes cannot be safely deployed for fear of injuring the patient in these situations. Rhyno's unique cutter blade protrudes less than 1" into the occupant compartment and can therefore be used even when patients are near or even impaled inside the glass.

Having used the the tool during a training scenario the initial access hole was easily created using the RHYNO blade, although it does come with a 'mini halligan bar' to make the initial hole in the windscreen for those who aren't comfortable in 'banging' the RHYNO blade through the laminated glass.

The tool then effortlessly cut through the glass with little resistance – the result was laminated glass cut without the traditional manual 'sawing motion,' without the traditional flying glass particles and dust and without the sharp jagged edges left by traditional windshield cutting methods. Glass particles were produced although the majority were deposited outside of the passenger compartment. By utilising the Packexe 'Smash' system in association with this product produced remarkable results and almost totally alleviated any penetration of glass particles within the passenger compartment.

The tools statistics are also very impressive with the tool being powered by a 14.4 Volt motor utilising Lithium-ion batteries and cutting between 20 – 30 windscreens on a single battery charge. Cutter blades last for at least 100 windscreens and can be easily replaced in less than 2 minutes.

The RHYNO Windshield Cutter comes as a kit, which includes the following:

- 14.4 Volt RHYNO Windscreen Cutter Tool
- Two Lithium Ion batteries
- Two Suction Cup Glass Lifters
- Cutter blade spanner
- Mini Halligan bar
- Carrying CaseUser's Manual

User's Manual

For more information, go to www.wecuttheglass.com

IFF

Extrication Team — winners of the 2013 UKRO Extrication Challenge

Steve Barrow is team

Fire and Rescue Service

manager of the Hampshire

#### Packexe® Sharpswrap®

Rapid, effective sharps protection



#### **Packexe Sharpswrap**

- Protects from sharp points and edges
- Quick and easy to apply
- Heavy duty self adhesive film with light weight dispenser
  - Up to 50 uses from 1 roll of film



#### **Packexe SMASH**

- Proven to strengthen glass
- Protects the rescue team and the casualty from glass fragments and dust
- Effective on all glass types
- Purpose designed adhesive to hold glass in place or remove in one piece

If you would like to arrange a site demonstration please contact sophie@packexe.co.uk

Tel: +44 (0)1392 438191





www.packexe.co.uk



## Heathrow Airport Service Update

British Airways Airbus A319 incident





**Graeme Day** 

2013 has been a busy time for London's Heathrow Airport Fire and Rescue Service. In recent months the main highlights have been:

- New PPE
- New fleet of Rosenbauer Panthers
- New Fluorine/Organohalogen Free International Civil Aviation Organisation (ICAO) Level B compliant foam
- Four aircraft incidents

#### **New PPE**

ondon's Heathrow (LHR) Airport Fire and Rescue (AFRS) Service has now been equipped with PBI Gold personal protective equipment (PPE) supplied and managed by Ballyclare.

After a comprehensive fitting process, each member of the AFRS has been issued with two full sets of PPE and Ballyclare's bar code system ensures that the PPE remains in good condition and therefore, compliant with EN 469. All kit can be tracked electronically by AFRS and Ballyclare managers and is subject to periodic internal and external audit. Each item is subjected to a multipoint inspection plan before being assessed as suitable for continued service. Stringent quality control measures are in place and items are inspected before they leave the manufacturing facility. Ballyclare is fully accredited with Article 11b for the manufacture of complex PPE.

LHR AFRS has provided a purpose built facility at its headquarters fire station for the storing of PPE for all personnel. This ensures that the garments are held in a controlled environment and out of direct sunlight and the Watch Manager responsible for PPE has built a robust working relationship with the team at Ballyclare to guarantee life-long performance of the garments.

#### **Rosenbauer Panthers**

LHR AFRS has recently completed a major foam tender replacement programme which has seen the service replace its ageing fleet of foam tenders with state of the art Rosenbauer Panther CA-5 (6x6) vehicles; an investment in excess of £8 million.

Following an extensive evaluation process, the Heathrow project team chose the Panther vehicles which are manufactured by Rosenbauer in Linz, Austria and supplied by UK based firm Angloco.

## **Fire and Rescue**



New vehicles outside Heathrow Airport Headquarters Fire Station

The project, which lasted for two years, has seen the team deliver a total of eight vehicles, three of which have High Reach Extending Turret (HRET) technology.

The Panther is renowned as one of the most advanced airport fire vehicles in the world and technologically superior to any appliance Heathrow Airport has had before. The vehicles have a variety of equipment that ensures that staff operating them are afforded the best protection from the risks involved in aviation fire and rescue

per second whilst retaining the ability to simultaneously produce fire fighting foam.

The £8 million investment in the Rosenbauer Panther fire appliances will help ensure that the Heathrow AFRS is equipped to deal with any incident at the airport for many years to come.

Heathrow AFRS, with its team of 110 dedicated firefighters, offers a world-class service in maintaining a safe airport environment; protecting the 80 million plus passengers that pass through every year along with the 83 thousand staff who work on site.

Each truck has seven times more horsepower than a family car and is capable of accelerating from 0 to 50 mph (80 kph) in less that 30 seconds achieving a top speed in excess of 68 mph (110 kph) – not bad for a vehicle that weighs in over 36 tonnes. They carry 11,500 litres of water and 1,400 litres of foam and have Caterpillar Euro 5 engines that meet strict European environmental standards.

activities e.g. joystick control of the main and bumper turrets from the vehicles cabin.

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Innovative specifications such as rear wheel steering allow the operators to turn the vehicles in less than a 23m turning circle which significantly reduces tyre wear. A four person cabin layout allows for flexibility in resource deployment to meet the ever changing demands placed upon the Service.

Infrared cameras assist operators in times of reduced visibility with the images relayed back to the cabin and displayed on large flat screens. Large fixed dry powder units allow powder to be applied via the 'dry chem' nozzle at over 10kg

#### **Fire Fighting Foam**

Heathrow AFRS recently renewed its fire fighting foam contract and after extensive research took the decision to purchase an ICAO Level B compliant fluorine and organohalogen free product Moussol FF manufactured by Dr. Sthamer – Hamburg.

In line with LHR Airports Ltd's (AL) environmental policy of reducing the impact of aviation on the environment, the feasibility of procuring an operationally compliant, environmentally friendly fire fighting foam was extensively researched. The first step in the process involved consulting with the UK's Civil Aviation Authority (CAA), before exploring the availability of such products within the aviation fire fighting sector. The whole process was supported by LHR AL Procurement department to ensure objectivity and impartiality throughout.

The AFRS insisted that the main criteria for selection must be operational effectiveness and compliance. As a result, foam manufacturers were asked to provide details of the ICAO Level B

#### **ARFF**

Ethiopian Airlines Boeing 787 Dreamliner incident



compliant fluorine/organohalogen free foams that they supplied. Once a list of foam concentrates that met those requirements had been collated, manufacturers were invited to give a presentation about their product and company to the LHR AL team set up to manage this project. The project management team comprised personnel from the AFRS and LHR AL Procurement and Environment teams. This part of the process enabled the team to establish how a particular company would be able to support the AFRS operation through partnership rather than just supply. The presentations were scored using the procurement template, created by the team, which ensured that an objective result was obtained.

Following the presentations, a shortlist was established and the listed companies were invited

to subject their products to a fire fighting performance test. The test was carried out by an independent, accredited test laboratory and witnessed by LHR AL personnel, CAA personnel and representatives from the relevant foam companies. All test results were later forwarded to the project team for consideration.

Using a non disclosure agreement drawn up by LHR AL in consultation with shortlisted foam manufacturers, the Environment

team was able to analyse the chemical make-up of each foam sample. This ensured that LHR AL could be certain that the products under consideration did not pose an environmental threat to the infrastructure of the airport.

Information and scores from the supplier presentations, operational effectiveness tests and environmental analysis were collated and examined by the project management team. Based on the information as a whole, a decision was then made to award a contract for the procurement of ICAO Level B compliant fluorine/organohalogen free foam that met the operational and environmental requirements of LHR AL. Delivery took place during the first quarter of 2013 to coincide with the phased delivery of the new fleet of



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**BALLYCLARE** 

Airport Rescue and Fire Fighting (ARFF) vehicles.

The whole process has been well received by the CAA and the use of our new fire fighting foam formed part of this year's LHR AL application in the British Industry in The Community (BITC) awards. The application resulted in Heathrow Airports Ltd being awarded Platinum status in Business in the Community's 2012 Corporate Responsibility Index. The process has also been put forward for a Chartered Institute of Procurement and Supply (CIPS) Award.

Heathrow AFRS new foam has also proved its worth operationally at the recent Airbus A319 and Boeing 787 incidents. The foam extinguished the fires quickly and effectively whilst maintaining excellent post fire security for AFRS and other personnel. It is interesting to note that because we had engaged the Environment Agency and local water undertaking during the foam procurement process, when contacted regarding the recent operational use of the product, they had no concerns regarding its environmental impact. This meant that there were no clean up costs as a result of either incident.

#### 24th May 2013 – British Airways Airbus A319 Incident

Passengers on Board (POB) – 75 Cabin Crew – 3 Flight Crew – 2 No Hazardous Materials

#### **Summary**

The aircraft departed Heathrow for Oslo at 0716hrs. Both engine cowlings failed on take off, depositing debris on the Southern runway. The aircraft returned to Heathrow on its No.1 engine, the Captain having shut the No.2 engine down. The flight deck crew discharged both extinguishers into the No.2 engine. On approach to Heathrow the incident was upgraded to Aircraft Accident Imminent (AAI) and the Captain declared a Mayday. The No.2 engine was still on fire on approach and landing. The fire was extinguished by Heathrow Airport Fire and Rescue Service crews using two monitors and two side lines, forward and aft.

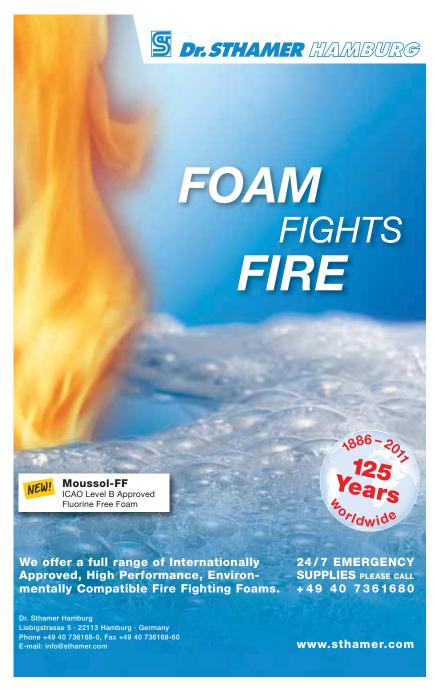
In-house and multi-agency de-briefs were held and the key points of interest were:

- Heathrow Air Traffic Control (ATC) received numerous calls from a variety of callers in the London area reporting an aircraft on fire passing overhead
- AAI called by ATC as the aircraft's approach was unstable and above the glide path
- RVP (E) called but it had been closed the day before
- From landing to the end of the evacuation 165 seconds
- Evacuation took 73 seconds
- Engine fire extinguished in 55 seconds
- 20 litres of ICAO Level B fluorine/organohalogen free foam used at a cost of £71
- No clean up costs because fluorine/organohalogen free foam was used
- Two minor injuries as a result of the evacuation
- All operational and environmental regulatory requirements were met
- Refresher training arranged with LFB covering Incident Command roles and responsibilities, aircraft familiarisation and role of Airport Fire and Rescue Service.
- AFRS Response policy being rewritten to reflect AFRS/LFB roles e.g. handover of incident to LFB

#### 12th July 2013 – Ethiopian Airlines Boeing 787 Dreamliner Incident

Immediately prior to the Ethiopian Airlines Boeing 787 Dreamliner Incident, the Heathrow AFRS dealt with two aircraft incidents as follows:

- **1** 1526hrs a fire reported on board a Boeing 777 Cargo aircraft full emergency declared. Full Evacuation via airbridge. Captain discharged all fire extinguishers but the fire alarm not silenced. LHR AFRS actions:
  - Deployment of 3 x 2 person BA teams (1 internal, 1 external, 1 open wear)
  - Thermal Image Camera utilised to ascertain heat source
  - Issue found to gas from rotten fruit in cargo hold
  - Incident stood down at 1626hrs
- 2 1533hrs smoke reported coming from port undercarriage of Boeing A340 – Local Standby Ground declared. Incident closed 1612hrs.



#### **ARFF**

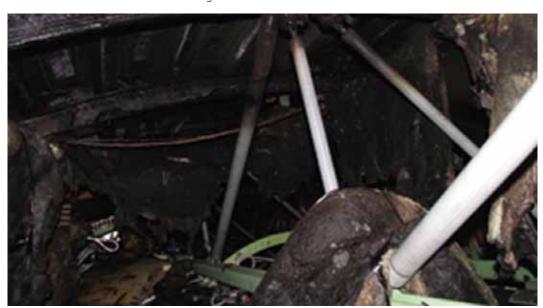
LHR AFRS resources were deployed to both of the above calls. The incidents involved the use of dry powders, hose reels and breathing apparatus all of which were being returned to operational readiness when the Boeing 787 incident started.

#### Ethiopian Airlines Boeing 787 Dreamliner Incident

The initial call was received at 1634hrs, at which point LHR AFRS resources were still carrying out post incident routines from the previous incidents. Due to the location of the Ethiopean Airlines Boeing 787, adjacent to Heathrow Airport Fire and Rescue Service's HQ Fire Station, AFRS were in attendance at 1634hrs although with limited resources. Smoke was visible from the top of the aircraft coming from the rear right door, cargo hold and avionics hatch.

- The AFRS Incident Commander (IC) positioned appliances, applied fire fighting media to the top of the fuselage and deployed hose reels
- BA crews were committed into fuselage via door

- main fire which was extinguished using hose reel jets supplied by AFRS Panthers
- Outside, smoke was still escaping from cargo and avionics hatches below the BA teams so a thermal image camera (TIC) was deployed to ascertain any other heat sources
- Because of this, the AFRS IC was concerned that there may be a secondary source of fire, possibly linked to the location of the aircraft's lithium batteries. If this was the case then the BA teams were now directly above a secondary heat source.
- LFB resources were called forward from the RVP
- Command and control instigated
- Mutually agreed that AFRS personnel would take the lead with hatch opening protocols supported by LFB
- AFRS personnel confirmed no secondary fire source in cargo or avionics bays or any involvement of lithium batteries
- LFB personnel deployed internally to support AFRS BA teams and assumed control of the aircraft.
- Cat 7 declared 1736hrs



Internal damage of Ethiopian Airlines Dreamliner

- 2 Left as an internal fire was suspected location unknown. There was also the possibility that persons were on board and unaccounted for.
- BA teams reported a smoke logged interior with no visibility and a temperature of 73°C – whilst working their way towards the fire at the rear of the aircraft
- External signs indicated that the fire was working its way forward towards the BA team. The location of fire was not known in terms of whether it was above or below the BA team
- Cat 0 declared by IC at 1640hrs

#### Incident Upgraded to Aircraft Accident 1643hrs (+9 mins)

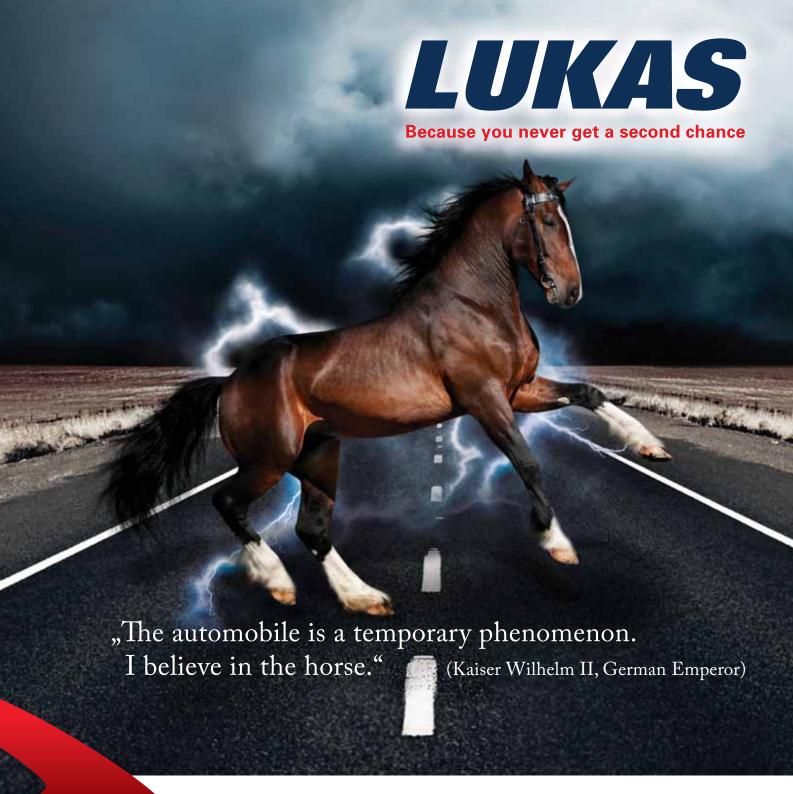
- This decision was taken in order to increase London Fire Brigade's (LFB) Pre-Determined Attendance (PDA) as the integrity of aircraft was now compromised with fire from an unknown source spreading towards AFRS BA teams
- AFRS BA teams located the source of the fire and reduced its intensity using an on-board Halon extinguisher. This enabled the BA teams to remove ceiling void panels and expose the

- AFRS Station Manager declared Cat 10 at 1748hrs
- Downgraded to Local Standby at 2019hrs
- Incident stopped 0449hrs

The British Airways Airbus A319 and Ethiopian Airlines Boeing 787 Dreamliner incidents were challenging ones for LHR AFRS personnel and the responding emergency services that provided vital support. As a result of the comprehensive multi-agency debriefs, operational procedures, training programmes and response models are being reviewed to ensure that future incidents can be dealt with safely, effectively and with the minimum disruption to Heathrow's passengers and stakeholders. Heathrow Airport Emergency orders are scheduled to be amended to reflect these reviews.

Graeme Day is the Compliance Manager for LHR Airports Limited Group Rescue and Fire Service based at Heathrow Airport.

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#### MARINE TRAINING





**Tom Guldner** 

## **Shipboard Basics**

#### The second in the series 'Shipboard Firefighting'

In my last article I stated that it wasn't necessary to become an 'old salt' neither in order to know your direction aboard ship nor to learn some basic shipboard nomenclature.

t many structural fires the direction around a fire building is given as exposures. Exposure 'A' being the location of the command post (usually the front of the building), 'B' is the area to the left, and all sides are thus lettered in a clockwise direction around the fire structure or emergency site.

As for direction aboard ship, imagine that you are standing on the deck of a ship and facing the front or 'pointy' end. The very front of the ship is called the bow and everything in that direction from your location is always forward. The extreme rear of the ship is the stern and everything in that direction from your location is aft or astern.

While still facing forward, the side of the ship to your right is starboard and anything in that direction from your location is considered 'to starboard'. To your left is port and everything in that direction from your location is 'to port'. Everything down is below and everything up is above. The floor is the deck, the ceiling is the overhead, and a wall is a bulkhead.

When stretching a hose line if you say to the ship's crew, 'Give me a hand with the line', don't be surprised if you are handed a rope. Aboard ship, a line is a rope. If you want to talk about a hose line you must say 'HOSE line'. Even if you don't speak these terms, you should understand them in order to grasp crucial information from the crew.

When a ship is built, the first concern is that it stays on top of the water – that is unless you are building a submarine!! To do this the ship must be built to be buoyant and be able to maintain that buoyancy. Rigid frames form the shape and provide contact points for the outer wielded plates

or hull. To prevent water from filling up the entire ship if there was a breach in the hull, the hull is divided up into vertical watertight compartments called Main Vertical Zones (MVZ). The MVZ are bounded by watertight bulkheads that generally extend from the keel or lowest part of the ship to the underside of the main deck. Although it must be noted that some may not and this is why it is important to consult the ships plans.

To allow passage throughout the ship watertight doors (Fig. 1) are placed in these watertight bulkheads. When these doors are closed, the watertight bulkheads will not only contain any water but also fire and smoke.



Fig. 1. Watertight door

Caution! Some watertight doors are hydraulically activated and can automatically close with extreme force. Personnel can be severely injured and hose lines severed or crushed thereby stopping water flow. Each door may be capable of being placed in the manual mode. Consult a

#### MARINE TRAINING

knowledgeable crew member because some controls may be overridden from the bridge.

The ships fire plans (Fig. 2) should be found in tubes on each side of the main deck at the point where you normally board the ship. These should list all frames, watertight bulkheads and watertight doors. Each of these doors should have a distinctive number painted on it as shown in figure 1.

If you are lost, find the number of the watertight door and transmit that to the command post. They should be able to find that numbered feature on the ships plan and send aid to you or direct you to the nearest escape route. If the fire plan doesn't list the numbers then there should be copies of the ships general plan on the bridge. Also, be aware that some older ships may not have these numbers.

There will also be important markings on the outside of the hull. Draft Marks (Fig. 3) will indicate the number of feet or meters of the ship that is under water. If you record the readings at the bow and stern and on both sides when you first arrive, you can then compare them to later readings. This will let you know if the vessel is listing — tilting to one side or the other. A log of these half hour readings should be maintained at the command post.

Other markings which may be found on the outer hulls of some commercial vessels will indicate the locations of holds, tanks, and other areas within the ship. Most tanks and holds are numbered starting with number one at the Bow. The numbering system can be easily determined from the ship's fire plan. The marks will generally have an upright line bordered forward and aft by identifying numbers. For example, if you saw the mark in Fig.4 on the side of the ship you would know that it is the bulkhead separating hold or tank 3 and 2. You would also know that the bow of the ship is most likely to your right and that you are looking at the starboard side. This is because if most ships start numbering from the bow then the lower number should indicate the direction to the bow. This is important in communicating a location to someone aboard. If, for instance, you noticed a scorched spot on the side of the ship it would help in locating the fire if you could tell someone the exact location of the scorch spots.

Another example of a hull mark would be:

#### ER 7

This would indicate the bulkhead separating the Engine Room (ER) in the stern from tank or hold 7.

Another distinctive hull mark might look like this:

#### ER CC 7

The two upright marks indicate watertight bulkheads separated by a space of only three to six



Fig. 3. Draft marks



Fig. 2. Ship's fire plans

feet. This marks the location of a cofferdam indicated by the letters 'CC' which is an air space separating a hazardous area from the remainder of the ship. On tankers there is usually a cofferdam between the engine room in the stern, and the last storage tank. In an emergency, the cofferdam can also be filled with water as an effective barrier to heat and fire.

There are other hull markings which will be covered in future articles.

In no way is this article a complete list of shipboard terms and features. It will hopefully be a start in your marine knowledge. Whenever possible, take a close look at any commercial ship you find.

Be advised, the ships Master is just that, 'The MASTER of that vessel.' We must remember this, even during a fire. You will need this man's help and cooperation. Don't think that you are going to barge onto his ship and take over. Under International law he is in ultimate command of his vessel. His title of Master had once read – 'Master Under God.' Many ships Captains take this title quite literally.

If the ship's Master gives his or her permission to come aboard then look for the features I have just mentioned. You didn't learn to pull ceilings in the firehouse kitchen! You will not learn theses shipboard items without 'hands on' experience.

Also remember that the crew will be very busy, but if possible ask a knowledgeable member of the crew to explain any features you do not know. The first and second Mates should be knowledgeable about the operation of everything on deck. Consult the Chief Engineer or his assistants for anything in the engine room or machinery spaces.

Many times seeing these marks and features for yourself will help you understand their meaning as well as their usefulness to the 'Land Based Firefighter' who may be called into this new marine environment to fight a ship fire. You should also point these features out to other members of your department. It could save a life – Maybe yours!



Fig. 4. Bulkhead separation markings

company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting.

Tom Guldner is a retired

Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His

Lieutenant of the New York

City Fire Department's Marine

For more information, go to www.marinefirefighting.com

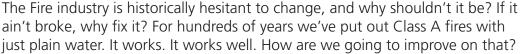




## Recent Trends in F **Applications**

Discharge of Compressed Air Foam stream from a high-rise building Photo courtesy of W. S. Darley & Co.







Michael C. Ruthy

here are a lot of companies around the world that are using new technologies to improve fire fighting methods and techniques, and these are worth reviewing to see if they may be appropriate for your department and your community. For those purists, many of these techniques still just use plain water, but in different ways. I agree that for most fires, water is our best tool. Consider some of the new ways to apply water and ask for demonstrations for the additional effectiveness.

One of the trends in the US, coming out of the military, or more specifically, the US Air Force, is the use of water at Ultra High Pressure (UHP), in many cases over 1300 pounds per square inch (psi)/90 Bar. Systems that can deliver 300 gallons per minute (GPM)/1150 litres per minute (LPM) at 1300 psi/90 Bar have been delivered and tested with excellent results. These systems require extreme power and are not suitable for most commercial chassis in general. Oshkosh Corporation has delivered several vehicles to the US Air Force, and all tests to date have been guite promising.

The high speed discharge of such a fire stream is quite remarkable – it literally suppresses the flames by blowing them out, like a breath of air on a candle, except at 1300 psi/90 Bar and including water. This new development has caught the attention of the National Fire Protection Association (NFPA), which has defined such systems in its latest upcoming edition of NFPA 1901.

UHP is also popular on small All Terrain Vehicle (ATV) sized units, where water carrying capacity is always at a premium. Making the most of your on board water supply is always a goal. One new product on the market is providing the best of both worlds, providing a UHP system for maximum firefighting duration, along with a higher volume pump to provide quick refills from nearby water sources or the ability to relay water to other vehicles in higher volumes. A local US supplier, E.J Metals, has built a large number of such ATV sized vehicles, which are very popular in wildland settinas.

In many parts of the world, there is a competing trend toward very large pumps, sometimes 3500 GPM (13,250 LPM) or more. These are most popular on industrial fire pumpers, such as those protecting petrochemical facilities, and also popular on large fire boats. Some shipbuilders, such as Canadian firm MetalCraft Marine, have built vessels equipped with two such pumps, for a whopping 7000 GPM (26,500 LPM) capacity. While not generally needed on a fire boat, vehicle mounted pumps needed improved priming capabilities. Many of these vehicles require multiple 6" or 8" hose connections when operated from draft, and a conventional 12 volt rotary vane primer is insufficient to prime in an adequate priming time. Using multiple primers is an option, but the electrical loads can become excessive in short order. This has led to the development of belt driven primers of greater capacity that can prime multiple 8" lines in less than 30 seconds. We expect this technology to drift down to smaller capacity pumps as well.

## ire Pump

In other parts of the world, the trend seems to be headed toward smaller vehicles. In Singapore, for instance, their Fire Service is embracing what they call the Light Fire Attack Vehicle, more affectionately known as the Red Rhino. These are small, nimble vehicles that can get right close to the action, even on narrow streets. Despite their size, they are equipped with a 500 GPM (2000 LPM) pump and have some Compressed Air Foam (CAF) capacity as well. Their lineup of fire bikes, known as the Red Scorpions,

are also equipped with CAF, and as motorcycles, can weave through congested traffic quite easily.

Compressed Air Foam (CAF) systems are nothing new, but some of the applications are taking a new direction. Recently, tests in Beijing and Shanghai have shown the effectiveness of these systems in high rise fire fighting. Due to the inherent lightness of its fire stream compared to plain water, it is possible to pump a compressed air foam stream considerably higher than a plain water stream could go, and do it while maintaining relatively low pressures so that standpipe systems are not over pressurised. Testing has been done on buildings as tall as 100 storeys.



High volume 3500 GPM (13,250 LPM) pump equipped with a belt-driven primer Photo courtesy of W. S. Darley & Co.



Small, agile vehicle with 500 GPM (2000 LPM) pump and CAFS Photo courtesy of Kevin O'Sullivan – International Sales

One trend in the US, that has been commonplace in most other parts of the world for years, is a trend toward using Power Take Off (PTO) driven pumps. Many departments and builders are starting to realise there is a continued de-emphasis on pumping operations. By some reports, only 5% of US fire calls involve actually pumping water, down remarkably from a few decades ago. This is likely due to more emphasis on sprinkler systems, greater use of fire retardant materials, and similar trends, but it is changing the role of the fire truck in many departments.

As departments are responding to a greater percentage of medical and rescue calls, the trend has been to have less emphasis on the pump compartment and more emphasis on additional equipment storage. Nowhere has this been more evident than on recent vehicle designs by such builders as Pierce, Crimson, and Emergency-One, who in recent years, came out with new designs that emphasised equipment storage capacity. To do this, they all utilised a PTO driven pump. Unlike rear mounted pumps, popular in much of international markets, they all maintained a more US traditional midship mounting location. They all have reported significant space and weight savings, as well as reaping some of the safety benefits of a PTO drive versus a split-shaft midship style pump.

Sprinkler systems are getting a boost in the US as more communities and States are now mandating them on new residential construction. We expect this to expand to more areas of the world. Given that the expertise of a typical homeowner would not be expected to be that of the owner and operator of a commercial property, a few novel solutions have been brought to market. There are systems that can self-test themselves on a regular basis, and alert a homeowner via mobile phone messages the results of such tests. Should the system record a need to deploy, it can contact both the homeowner and the local fire department automatically. We believe the simplicity of operation for such systems will be a big driver toward the average homeowner, who presumably

#### FIRE PUMP TECHNOLOGY

A fire vessel delivered to New Charleston equipped with large capacity pumps. Photo courtesy of MetalCraft Marine



may not want anything more complicated than the thermostat on their boiler.

One disturbing trend affecting many fire departments worldwide is the requirement to deal with vehicle emissions. While I think we can all say that having cleaner air and cleaner water are good goals, from what I have seen, some regulations in some countries are moving faster than they are ready for. This has led to trouble, and does not look like it will get better soon. The predominant issue is the type of fuels available in different parts of the world.

In the US, we are rapidly approaching the adoption of what is known as Tier 4 Final regulations. For most engine manufacturers, this has required the installation of a Diesel Particulant Filter (DPF) and a Selective Catalytic Reduction (SCR) system. On vehicles, this takes up valuable space, and on skid mounted engine driven units, it

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Slide in unit capable of Ultra-High Pressure and High Volume Photo courtesy of W. S Darley & Co.

can be equally problematic.

For overseas customers, this can lead to complications, as a Tier 4 engine cannot burn even low sulfur diesel fuel, but must be fed with ultra-low sulphur fuel, which is not available in all countries, even those that are ramping up requirements for these level of emissions. Needless to say, this is a recipe for disaster. Many engine manufacturers have intentions to maintain offering Tier 3 compliant engines for these areas of the world, but this, at times, results in long lead times and paperwork nightmares. Granted, it is a bigger nightmare to have your after-treatment exhaust components clog up after one tank of fuel, but it is certainly something to be aware of when you order new equipment.

Finally, in the material science end of things, it keeps getting better. As the trend for more power through smaller pumps has continued, the usage of what used to be exotic alloys in both stainless steels and bronzes has kept pace. Many of our pumps now utilise precipitation hardened stainless steel for their pump shafts, and aluminum nickel bronze for their impellers, resulting in stronger splined connections for more resistance to abuse and improper engagements. Several years ago, these materials would have been prohibitively priced for most applications. Hopefully, additional materials become more cost attractive so that all pump manufacturers can offer lighter weights and stronger alloys.

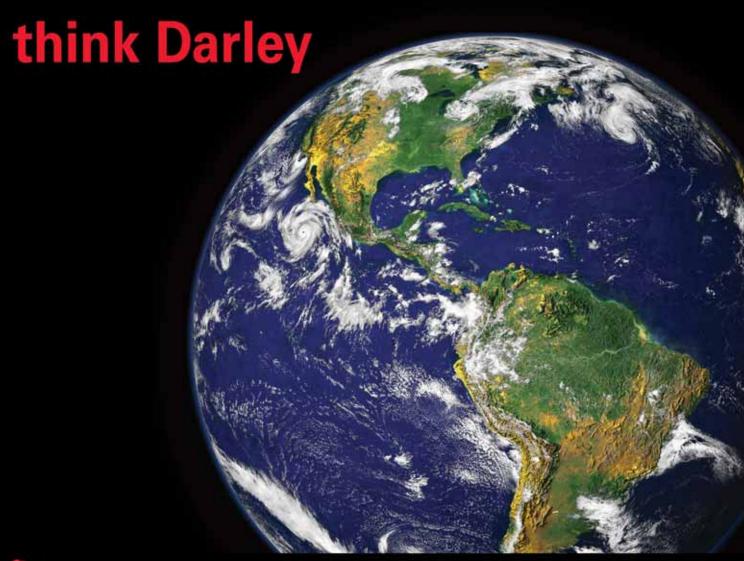
I'm still looking forward to eventually designing a pump out of Titanium. With the strength of heat treated steel, the corrosion resistance of 316 stainless steel, and the weight of aluminum – that would be awesome. The downside of course is some multiple of the material cost of Silver and the machinability of hardened Tungsten – it might not happen in my lifetime, but even an engineer can dream!

Mike C. Ruthy is Chief Engineer for the Pump Division at W.S. Darley & Co. He graduated from Lafayette College in Easton, Pennsylvania, USA in 1985 with a Bachelor of Science degree in Mechanical Engineering. He was employed by Hale Fire Pump Company in Conshohocken, Pennsylvania, before working for W.S. Darley and Co, in Chippewa Falls, Wisconsin, USA, in 1989, where he took the position of Chief Engineer in 1996. He has worked with over 100 companies internationally and is available at mikeruthy@darley.com



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LET'S WORK.





**Tony Topf** 

# The History of Thermal Imaging Innovation

The first infrared line scanner appeared in 1947 – one image took an hour to produce – but real technological advancements have meant that these cameras now serve many useful purposes but none more important than those that help save lives.

ver the years, the capability of thermal cameras has advanced beyond the expectations of those who first worked on this technology. Originally developed by the military for use in combat situations, it was once an expensive technology with limited application in civilian situations. Modern thermal imaging capability originates from the development of heat-seeking missile technology in the 1970s. The British Navy first developed its use for managing shipboard fires and it was then adopted by the US Navy and the technology started appearing in many other military applications such as weapons sights and locating the enemy in hidden spaces.

Scott Safety identified an opportunity to exploit the technology for civilian use and by the late 1990s the company was using Barium Strontium Titanate technology and making thermal imaging affordable and more accessible to larger parts of the civilian fire service market. Early examples of portable cameras were head mounted but these were extremely heavy, cumbersome, difficult to use and as a result, take-up was poor.

It was the one of the first companies to offer hand held thermal imagers for the fire service but with little experience of using and deploying this type of technology, adoption was slow initially. These early cameras were still expensive, costing around \$20,000 each they were a significant investment and were treated accordingly. It was very common to see a fire service purchase one thermal imaging camera (TIC) that was kept in the Fire Chief's car and then not deployed with the team

that needed it. Through building dedicated partnerships with their customers, manufacturers took on the role of educating and assisting them in understanding the real benefits of the new technology and how it could be used.

These original cameras sometimes weighed up to 7lbs and because they were so heavy, they weren't properly deployed to investigate the source of smoke. Firemen were already carrying many pieces of extra equipment and tools, so the TIC was often left behind. If used in a live situation, one person was responsible for carrying and using the camera and his colleagues then had to rely on him to communicate what he had identified

Throughout the period from the late 1990s, through significant investment, manufacturers continued in their efforts to bring more affordable, easy to use technology to the marketplace. As the technology advanced, they were able to offer products with more features in smaller packages and as the demand increased, prices began to come down. Today's TICs are probably 80% less expensive than they were when they were first introduced to the market.

As a result of the wider use of TICs, users have learned how to interpret the images they see and TICs are used not just for finding a fire but discovering more about convection, monitoring how swiftly a fire is moving, locating victims, identifying different gas layers, seeing how much petrol is in a tank or chemical plant and for situational awareness.



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Some modern TICs offer users the ability to select 20 different colour palettes but there is a debate about whether this ability may prove confusing to the user and require more equipment training and familiarisation time as a result. Users need to be able to understand the information as quickly and simply as possible. We have found that users will often prefer a black and white palette with the option to use intelligent colour settings showing objects as yellow when they reach 1000°C, orange when they reach combustion point of 2600°C and red when above 4250°C and a flashover is imminent. Hazmat teams use the technology for leak detection and determining how much liquid is inside a tank in a hazardous situation and, in particular, for detecting methanol flames that are otherwise naked to the eye. Having these types of features can be critical when making quick, split second decisions that will have an affect on the survivability of those in the vicinity

In recent years, fire and rescue services have become more proactive in identifying their own needs by working in cross-functional procurement teams to put together meaningful specifications and demands. Some of these demands have driven manufacturers to design smaller, fast attack cameras that can be deployed quickly, putting reliable, high specification and affordable equipment into the hands of those that really need it.

Whilst a large portion of the market needs small, lightweight, 'tactical' TICs, there is still a demand for cameras with enhanced features for use by specialist teams such as urban search and rescue, hazmat and law enforcement officers. These users may need higher resolution technology, larger displays and integrated tracking systems with specialist accessories that add size and dimension to the camera. These may include laser pointers, lights, visible light cameras, transmitters, video recording for training debriefing and evidence collection. Depending on their role and requirements fire and rescue teams are now often buying 2-3 different types of camera to meet specific applications.

TIC video recording capabilities vary greatly between manufacturers and range from between 30 minutes up to 4 hours, so depending on the needs, this should also be considered. Specifiers need to decide on the general scenarios the TIC's will be needed for as this will dictate where in this range the cameras should be choosing. Some of the newer models have cameras that automatically begin recording when the camera is energised, removing the possibility of the user forgetting to turn it on. The image quality should also be tested in real life situation, as the performance can vary depending on the environment (i.e. heat and cold)

It's important during the selection process that through life costs, maintenance and repair charges are taken into account. Some parts may be suitable for factory repair and others could need to be replaced. Germanium lenses, for instance, are easy to replace but are not suitable for factory repair, so this will make an impact.

A real testament to the robustness of modern TIC's is the tumble test and customers should consider the manufacturers claims carefully in order to make the best choice. The US standard NFPA 1801 Standard on Thermal Imagers for the Fire Service

#### THERMAL IMAGING

stipulates that the TIC must be put into a 4ft (1.5 meter) drum and tumbled for 30 minutes in order to pass the test. Water submersion tests and spray jet tests are equally as grueling for the TIC's, but these tests ensure they are robust and sustainable pieces of equipment. Most manufacturers have TIC's compliant to IP67 (submersion in water for 30 minutes) but only a limited number have them rated to IP66 (90psi jet at 100lpm per minute). When you consider the possible real-life working situations, the jet test is a much more realistic test, so when procuring TIC's, it is recommended to look out for the results of these tests.

Improvements and developments in the design and technology of the modern TIC continue to be introduced. Many new technologies are pioneered in the US first and are then introduced into the European market. Some changes are driven by the differing Standards set in each continent or country; some are as a result of the differing modes of operation by the fire and rescue services. For example in North America, where fire fighting techniques are more invasive, BA sets often include a built-in radio beacon as standard. This is activated when a fire fighter becomes incapacitated and sends out a distress signal that can be tracked by receiver on the TIC. This facility means that we can provide a thermal imagining camera to rescue teams that has the ability to guide operators to a 'downed' firefighter very quickly. In an emergency situation, this could mean the difference to life or

The ability to package lithium ion batteries has

made it much easier to manage equipment lasting up to ten years and has reduced the need for maintenance charging as is this case with nickel metal hydride batteries. Manufacturers are also moving towards the possibility of making IS or ATEX camera's for HAZMAT more widely available. Innovations in the exterior materials used and the advanced circuitry incorporated in these cameras means that TIC's are much more robust and able to withstand harsher environments compared to those on the market 15 years ago. These types of improvements have also lowered the overall weight of TIC's, making them much more portable and user friendly when deployed in real working situations.

There is no doubt that advancements in technology and engineering will continue to provide us with the opportunity for further product development but there is no doubt that Thermal Imaging technology has come a long way and access to this technology has transformed the way today's fire and rescue services operate.

Scott Safety is celebrating 80 years as a global leader in the development and manufacture of leading-edge fire protection, detection equipment and technology including safer industrial and military emergency preparedness and response. Since the introduction of thermal imaging technology to the fire services, the company has been at the forefront of innovation providing advanced, fire-ground proven TIC's to first responders for use in search and rescue, overhaul operations and hot spot identification.

**Tony Topf** is Accountability Product Manager with Scott Safety

For more information, go to www.scottsafety.com



## Managing a Major Investigation – A P





Veronica Adlam DMS, CMIOSH, MIIRSM

By the nature of health and safety the occurrence of accidents and safety events are unpredictable but not necessarily unforeseeable. However, I don't imagine any Health and Safety professional ever expects to wake up to a telephone call, as I did in February 2005, imparting the dreaded news that two of your colleagues have died in the act of doing their job. It's shocking in the extreme. A wave of guilt comes over you when you momentarily question whether you have done your own job thoroughly enough.

or nearly 35 years I have worked for local government departments – including Education and Social Services, and since July 2000 the fire and rescue service. I qualified as a Health and Safety Practitioner in 1994 and became a Chartered Member of the Institute of Occupational Safety and Health (IOSH) in November 2005.

In the early hours of Wednesday 2nd February 2005 a fire broke out in a block of flats in Stevenage, Hertfordshire (pictured). Despite successfully rescuing one of the occupants, two young firefighters lost their lives attempting to rescue the second.

My role as the Service's health and safety adviser resulted in an early morning phone call to me from the Command and Control Centre to alert me to the tragic circumstances. That day was a haze consisting of phone calls; questions; instructions; meetings and activity. You are bombarded with requests and it is difficult to identify what is priority. My role was to support the senior officers; provide information and assistance and finally manage the day to day running of the Accident Investigation Team (AIT) which was set up within 24 hours of the incident.

It was a steep learning curve for all concerned. Working relationships were established and existing ones were sometimes strained. Everyone pulled out the stops though – that's the one thing about the fire and rescue service which we can be proud of. When the chips are down we all pull together.

Within a year of completing the investigation I decided to record my experience. As I had not

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## Accident ersonal Account

been provided with any written advice it was intended to be a guide for my peers in carrying out a major accident investigation into a workplace death although it also became a cathartic exercise.

Investigating a work place death is challenging and charged with a variety of emotions including guilt – did I do enough?; anger – how did this happen?; compassion and empathy – after all you are human; frustration – needing to discover the reasons why; and relief when you finally establish the facts. It requires all your inner resources of determination and energy. However you will be rewarded with considerable peer support, refreshingly revealing moments of good practice as well as desperate unintentional errors.

I felt compelled to pass on the knowledge I gained from this process. On the first day of the investigation an officer said to me, in an attempt to be encouraging about the very long road ahead, 'What doesn't kill you makes you stronger'. It is indeed true and I learnt a considerable amount but it is a very personal strain.

our own employees and one occupant of the flat) was the subject of a criminal investigation. In some areas, the ambulace service is required to report to the police any industrial accident which is fatal or involves any suspicious circumstances.

The police control the crime scene. Evidence will be collected by them and impounded as exhibits. The HSE and police will liaise on this matter and in our case they also liaised with our own internally established Fire Investigation Team (FIT) to assist their own Scenes of Crimes Officers (SOCO).

The police will expect you to provide experts from your organisation to explain the workings of equipment, processes and procedures. Organisational jargon will need to be explained fully. You will be expected to provide all the information, documentation, records and personnel that the police may require to enable them to progress with their criminal investigation. The more time you spend providing background information the simpler and smoother the early stages of the criminal investigation will be. Your legal team

The process of carrying out an accident investigation should be the same whether it is a fire and rescue service, another public body or a private organisation. The death of someone whilst they are at work, doing their job, should be afforded the care and attention it deserves.

The process of carrying out an accident investigation should be the same whether it is a fire and rescue service, another public body or a private organisation. The death of someone whilst they are at work, doing their job, should be afforded the care and attention it deserves. Regardless of any legal duties, such as the Health and Safety at Work etc. Act 1974, we have a moral obligation to find out what happened and why and to prevent it happening again to someone else, somewhere else. It's the ultimate respect.

The process needs to be followed methodically, accurately and openly. There are a number of areas to be aware of which I outline below.

#### **The Police**

A workplace death will inevitably involve the Health and Safety Executive (HSE) but also more immediately, the police. They will investigate a workplace death to ascertain if a serious criminal offence has been committed. They will ensure that there are no suspicious circumstances.

The Crown Prosecution Service will decide whether there is sufficient evidence to warrant prosecution for manslaughter. The police will work closely with the HSE and co-operation is expected from you the employer. The police were already in attendance at the fire evacuating the block of flats and assisting the residents. The cause of the fire that resulted in three deaths (two of whom were

may wish to influence what is shared but this is something for the lawyers to address.

Before any internal accident investigation can start, the vast majority of your time will be spent responding to the requirements of the police through the management structure of your organisation. This part of the process is not optional.

#### The Coroner & Inquest

The Coroner has the right to request all the information they need to complete their findings as to the cause of death. The inquest will usually be opened and immediately adjourned with interim reports from the police and will await further reports from the HSE together with your organisation's investigation report. Inquests can take several months and sometimes even up to a year or more before being re-opened and convened. This can of course add to the stress and distress of relatives, colleagues and the investigation team.

#### **Establishing an Investigation Team**

The Management Team immediately needs to assemble and appoint a solid Investigation Team. These people need to be released from their day to day jobs to concentrate solely on the demands of the police, the HSE and the senior management involved in the practical matters of the tragedy. A key member of the team should be the Health & Safety Adviser/Manager and other staff and

#### INVESTIGATION



colleagues who are experts in the operational aspects of work the accident occurred in. This may be difficult and sensitive, particularly if they know well and worked with the people who have died.

Administrative support is a must. The amount of paperwork that will be generated is enormous. Filing systems for the evidence gathered, correspondence, interviews, statements etc. needs to be set up immediately.

Although it is good practice to allow employee representatives (from recognised Trades Unions) to join the investigation this can lead to a conflict of interest at some stage during the investigation so clear protocols need to be established from day one. The investigation should be headed and led by a member of the senior management team, giving it credence and support. The HSE will expect the senior sanagement to be fully advised and involved – in other words they need to take responsibility.

#### **Practicalities**

Confidentiality and security is essential so lockable office accommodation is essential, together with reliable IT systems and someone with excellent IT skills and record management abilities. Audio/visual equipment may be useful and includes radios, televisions, DVD players, digital tape recorders and dictation facilities.

Filing facilities (as mentioned this is extensive!) and secure, dry storage for impounded items

which could be anything from a window frame to someones personal protective clothing. Documents and evidence may need to be stored for some years pending court cases and claims so this needs to be considered and a long term plan should be in place.

#### Health and Safety Executive (HSE)

The HSE must be advised immediately and they will need to know the police officer in charge of the investigation. If the incident occurs out of 'office hours' there will be a duty HSE Inspector who will be called out or they may decide to pass it on to your own local Inspector who will be more familiar with your organisation and business.

The HSE will not begin their investigation until the police have handed the case over to them. The HSE will tell you what they need and may decide to interview witnesses themselves under Section 9 of the Health & Safety at Work etc. Act 1974. Depending on their own resources the HSE may decide to let you continue your internal investigation. In public organisations there

are usually more resources and people available to carry out detailed accident investigations which the HSE may take advantage of and await the internal investigation before producing and sharing their own findings.

The HSE want employers to learn from accidents and the only way this is achieved is by being open, honest and probing. The HSE will want to set up and agree regular meetings to review the progress of your investigation and may wish to glean information for their own investigation. The presumption is you are guilty until proven innocent in health and safety law and the aim of the investigation is to establish if all reasonable action was taken to prevent such an accident occurring.

As part of their responsibilities the HSE will also be in direct contact with the relatives to keep them appraised of the investigation process. This is something which the organisation should be aware of

You may be interviewed yourself by the HSE at some stage of their investigation to check facts and clarify process issues.

#### **Legal Advice**

Involve your solicitors from the start. They need to advise the organisation on disclosure of documented and spoken information, liaison with families and relatives, liaison with employee/trades union representatives, preparing staff for





attendance at court, advise you on records management etc.

#### Data Protection, Freedom of Information and Disclosure

This is a minefield and an expert in this area is essential to avoid disclosing personal information to third parties who have no legal right to it. This includes the press, union representatives or other employees.

#### **Employee Representatives & Trades Unions**

Joint investigations with Trades Unions can be useful to avoid the duplication of effort. Involve the unions from the start but establish accepted protocols for communication and liaison.

The police will not want the internal politics of the organisation hindering their criminal investigation. However, at some stage there may be a conflict of interest between the organisation and the employee representatives. This may be as a result of pending civil action being taken by the union on behalf of relatives or by the relatives independently.

All the information provided to the representative bodies needs to be approved by the senior management team, logged and realistic the timescales for provision agreed.

My personal experience with the appointed Trades Union (Fire Brigades Union) Investigation Team was challenging and unnecessarily stressful. They demanded information from the start, and wanted it promptly. This was a difficult balancing act and we needed guidance on boundaries. We had, and have, a good relationship with our FBU representatives but the FBU Investigation Team included regional representatives who did not appear to fully appreciate that this was clearly an emotional time for the local representative.

#### **Insurance Issues**

Your organisation's insurers will want to know the circumstances of the death(s) in order to assist the next of kin with interim payments from Employers Liability arrangements. Civil processes may follow at a later stage with claims for compensation.

#### Relatives

The police will appoint Family Liaison Officers (FLOs) who can manage the delicate process of informing relatives, next of kin etc. of the death of their loved one. However, the organisation may also wish to appoint officers with the responsibility for maintaining contact with the family via the FLOs and ensure they are kept informed of progress with the internal investigation.

#### **Welfare of staff**

The Occupational Health department will play a major role immediately supporting the colleagues involved in a fatal incident. These employees are not only required as witnesses by the police but will subsequently play a valuable part in the investigation. They will be asked to go over the event a number of times and this will cause distress with the potential for post-traumatic stress disorder (PTSD). Confidential counselling support should be publicised throughout the organisation – it is surprising how far reaching the effects of a workplace death can be and how long after the event the

symptoms of PTSD reveal themselves, sometimes in very challenging ways. Long term support is essential to staff and their managers or supervisors.

The Fire and Rescue Service have access to the Fire Fighters Charity which provides both practical and physical support for injured firefighters and their families and other members of the fire service community. Utilising their facilities can also prove very beneficial for those involved.

The effect of this event will have on your personal life and the emotional turmoil you will go through should not be underestimated. The activity will be intense in the early weeks and months so this is mentally and physically demanding. You will be running on adrenalin but that soon has a negative effect. The stress causes sleepless nights; emotional outbursts; frayed tempers of all involved. The police, HSE, senior management and other colleagues will all be bidding for your attention. You will analyse things over and over again in such a way that you are unable to achieve closure in the same way others in the organisation are subsequently able to. You will personally own it that is why you have gone into this profession. It's not a bad thing, it spurs you on. Your professional survival depends on the successful conclusion of the investigation with the ultimate aim to prevent this happening again. People want to know what happened and why, as soon as possible, but you need to resist the urge to rush every task - you will run out of energy and risk producing a poor result.

Senior officers/managers may appear to be coping but they may have mixed feelings about their

role and responsibility within the organisation, potentially feeling threatened and vulnerable. As a result you may not get the pastoral care you would expect from your manager so peer support is invaluable and often partners, friends and work mates are the people you to talk to. However, you must be careful of breaching confidentiality and guard against disclosing facts.

My husband is a Police Detective (not in Hertfordshire) and I benefited from his personal skills and his guidance on basic investigative techniques which were invaluable to me personally, enabling me to set up administrative systems which, although simple, worked. His patience and support were immeasurable at a time of extreme stress for me. Above all, he understood the situation, having investigated murders and serious crimes, and the importance of accuracy and thoroughness.

#### Interviews

- Police You may be interviewed yourself.
   Members of staff will be interviewed as
   witnesses to the incident that led to the
   workplace fatality. They need to be supported
   both before and after the event.
- HSE Under Section 20 of the HASAW Act the HSE Inspectors have powers to interview employees as part of their investigation into workplace death and can require employees to give any information to answer questions posed – whether in writing or orally. The employees will be required to sign a declaration



#### INVESTIGATION



of the truth of their answers. A refusal to answer questions shall be admissible in evidence against that person in any proceedings. However, under Section 28 no information obtained under this power will be disclosed without the consent of the person but this does not prevent disclosure to the HSE, a government department or any other enforcing authority.

nity for the representative bodies to incorporate their questions in a joint approach so that the individuals are not unduly distressed by undergoing two sets of interviews. Once again the protocols should be agreed beforehand.

#### Where, when, who, what, and why?

These are the basic key questions which will form part of the investigation but there is a wide range of information and guidance available from the Health and Safety Executive website www.hse.gov.uk to assist you in the investigation process although this in itself can be very overwhelming.

#### Such quidance includes:

- HSG 65 Successful Health & Safety Management
- HSG245 Investigating Accidents and Incidents
- HSG48 Reducing error and influencing behaviour

Various methodologies exist and establishing a sequence of events against a time line is the first step. The investigation strategy involves collecting evidence; considering the facts; comparing what happened against existing policies and procedures (local and national guidance); and most importantly make changes to any guidance, policies or safe operating procedures to prevent it happening again.

However, the best support comes from a peer who has, unfortunately, experienced the same situation. They can coach and guide in a sympathetic and independent way, providing a much needed ear when that phone call comes.

As a result of this experience I had been collating information on the process throughout the investigation and I produced a practical guide both for me and my senior management team – just in case it happened again. Sadly it did in 2007 when a Hertfordshire Watch Commander was killed whilst attending a car fire.

Unfortunately it has also proved useful for a few of my peers over the last 5 years. My guide was subsequently enhanced and adapted by

Although it is good practice to allow employee representatives (from recognised Trades Unions) to join the investigation this can lead to a conflict of interest at some stage during the investigation so clear protocols need to be established from day one. The investigation should be headed and led by a member of the senior management team, giving it credence and support. The HSE will expect the senior sanagement to be fully advised and involved – in other words they need to take responsibility.

In a civil action for damages either the plaintiff or the defendant may request the information from an inspector.

Internal – Ideally witness statements or contemporaneous notes will have been gathered from every individual who was involved. Further information will be needed to confirm actions and verify evidence. Once the police have confirmed they are not taking any action, the Service may wish to interview those involved to confirm evidence and actions or elaborate where necessary. This can provide an opportu-

Hampshire Fire and Rescue Service,who also lost fire officers in a major fire in 2010. The document 'Death in the Workplace – Guidance for United Kingdom Fire and Rescue Services' was published in May 2013 by the Chief Fire Officers Association (CFOA) and is available on their website: www.cfoa.org.uk/15542

Finally, this is not an experience which ever leaves you but my thoughts are always for the relatives, loved ones and work colleagues of those firefighters who have lost their lives doing their job. Regrettably, the loss continues.

Veronica Adlam is Health & Safety Manager at Hertfordshire Fire & Rescue Service, UK

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# Global Positioning Systems (GPS)



A.K. Rosenhan FIFireE, CEng

#### ensures prompt arrival for the emergency services

No matter what the emergency, no matter what agency is involved (Police, Fire, EMS), getting to the site of the emergency call in a prompt and safe manner is of paramount importance.

ertainly the encountered travel conditions of weather, road condition, traffic, appliance performance/capabilities, and other physical facts are of basic importance and are rather apparent and they change a bit for each and every response but are relatively easy to handle and accommodate. But an item even more basic is knowing the best geographic route to utilise, with the data involved being pretty constant as roadway locations do not change from day to day.

Establishing response routes is relatively easy to determine in a built-up or municipal area, but when responding to a rural area the ability to find a specific address can be somewhat of a problem. Not only will personnel not be as familiar with the details of the area, but many properties will not be properly and plainly marked. Street signs may be non-existent or at least weathered to the point of being unreadable. Going down a country road and passing a turnoff or driveway with a large fire

access, and just out and out 'trails'. With almost 500 square miles (1294 km²) to cover, many of these roads had been given names by locals and were without markings or identification signage. The only way any responding emergency personnel were even aware that residences and buildings were on these passages was the number of refuse containers placed out on the end of passages where they intersected with a county maintained road where a refuse route passed. And then these were present only on refuse pickup day.

And even though there were some address numbers displayed they weren't always consecutive, inclusive, odd and even numbers weren't always on the expected side of the road, and in some cases there was absolutely no correlation between an address number and a physical location. Some addresses, along with roads and private drives, simply had 'made up' address names and numbers.

Establishing response routes is relatively easy to determine in a built-up or municipal area, but when responding to a rural area the ability to find a specific address can be somewhat of a problem. Not only will personnel not be as familiar with the details of the area, but many properties will not be properly and plainly marked.

appliance causes delay, one doesn't turn these vehicles around very easily. Even if personnel are familiar with an area, it's a challenge to remember every road name and location.

Certainly there are a myriad of addressing schemes found in various countries. Some involve the use of simple address numbers and road names. Others will involve the name of a neighborhood, building, landmark, or local alphanumeric name. Such may cause considerable confusion, even with those responders familiar with their response area.

In one rural county in Mississippi, USA there was a hodge-podge of improved and unimproved roads, private drives, lanes, farm roads, forestry

In the 'olden days' part of a dispatch would include the property owner's name along with the address. This was really handy for local firefighters as they were familiar with a neighbor's name, assuming they had lived in the area for a while, but not so familiar with a numerical address. But with new privacy laws, especially where medical response was involved, names could not be broadcast over the radio – couple all this with personnel turnover and those responders that just didn't know their areas, problems arose.

So the Emergency Services were handicapped in finding the location of a call, especially at night and in bad weather.

#### GPS TECHNOLOGY

The Mississippi County governing Board of Supervisors recognised this growing and continual problem and contracted with a Planning and Development District to not only completely map the county but to also re-address all county residential and building locations to conform to a nationally recognised mapping/addressing standard. This was a formidable undertaking, not only because of the amount of data to be gathered but also a political problem as many residences would have new addresses. The investment in amassing all this data would have applications far beyond the emergency services, such as routing refuse vehicles, school buses, and road maintenance. Problems were anticipated but due to good planning and public relations the project went smoothly.

The use of small, portable GPS instruments allowed data gathering to occur at a fast pace with a minimum of personnel being involved.

While the 487 county maintained roadways were quickly identified and re-numbered, a big surprise was that some 174 private roads, driveways, lanes, and such were identified and mapped. Most of these had never been on anybody's map, were named by adjacent property

was the possibility for confusion but with good planning, excellent publicity, mail outs, and word of mouth, problems were minimised and the public understood why this readdressing was done and how it worked. With many properties having 'new' and 'old' numerical addresses there were problems with residents reporting where an emergency was but not only did the E911 dispatcher know the name, address (both 'old' and 'new' numeric), and geographical location from the caller's location, they now had a GPS location for a cell phone caller. Furthermore, residents didn't always update the numerical addresses on their roadside mailboxes or signs, if there was a sign at all. Hence a responder could get confused as to where to go. This problem was taken care of by incorporating both the 'old' and 'new' addresses into a master database and any display being plainly marked as to which address it was.

In order to take advantage of this master database it was decided to use standard GPS units, available for less than \$100, which were programmed to accept these new data. The original functions of the GPS unit were not affected with the added database simply an option for the user.

# The use of small, portable GPS instruments allowed data gathering to occur at a fast pace with a minimum of personnel being involved.

owners, and were not 'official' or recorded names. All of these new names were entered into the master database with all properties being measured and given addresses. A photograph of any buildings was also taken to be added to a data base for not only the E911 System for the County but also for the Tax Assessor to ensure tax roll completeness and accuracy. In total there were some 10,782 structures entered into the database. These data were also used for a myriad of uses to include county land use planning purposes, grant application data, road maintenance planning, and other analysis projects. In all some these 10,782 various structures, such as residences, barns, businesses, outbuildings, and shops were identified and cataloged.

The new addressing scheme has some interesting properties, i.e. by simply looking at the numeric of the address one can determine how far from the beginning of the road one is going. If the address is 3,998 its some 3,988 (6.4 km) miles from the start of the road, this really helps for responders knowing whether to turn right or left upon reaching a road intersection and certainly the dispatcher may now easily give cross streets, landmarks, distances and other directions to responders along with a description of the buildings on the property.

In addition to the geographic information available it is now possible for the dispatcher to have additional data relating to; a record of previous calls to that address, data on any special medical needs of residents at that address (oxygen generators or storage, physical problems etc.), information on any hazardous material at the location, as well as any problems with access.

When the majority of addresses changed, most by number change and some by road name, there

Emergency response vehicles, as well as personally owned vehicles utilised by volunteer firefighters, were quickly equipped with such GPS units and instead of the usual procedures for utilising a standard GPS which involved inputting the name of the town, the numerical street address, and the street name, the data input was greatly simplified. With the master database all a user needs to do is enter the numerical value of the desired address. This one data entry is easy to do, is quick, does not require correct spelling (especially handy when street names sound alike, are hard to spell, or have not been heard correctly) and a list of all addresses in the county that have that numerical address value are presented on the screen. One just scrolls through these listings until the desired street name is found, it is then selected and the normal functions of the GPS unit take over. Driving directions, both graphical and oral, are generated as per the normal unit function. A street name may also be selected as desired with a map and directions displayed.

Since implementing this system responders are directed to within 5.28 feet (1.61 meters) of a desired location and the E911 operator has greatly enhanced the ability to follow up with responding units to ensure they find the right property, know the location and proximity of water supplies, road closures or problems, and of any hazards to be encountered at that location.

This system has proved to be a rather valuable tool in ensuring the prompt arrival of emergency services in a safe, accurate response for all emergency services. The initial effort was formidable and the maintenance of the database is an ongoing programme, but it's well worth the cost in the effect it has had on providing emergency services to county residences.

A.K. Rosenhan is the Fire Services Coordinator for Oktibbeha County, Mississippi, USA. He is a Fellow in the Institution of Fire Engineers, a Chartered Engineer in the UK, and does consulting work in fire appliance design, accident and failure analysis, and writes for numerous fire and rescue service publications



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DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

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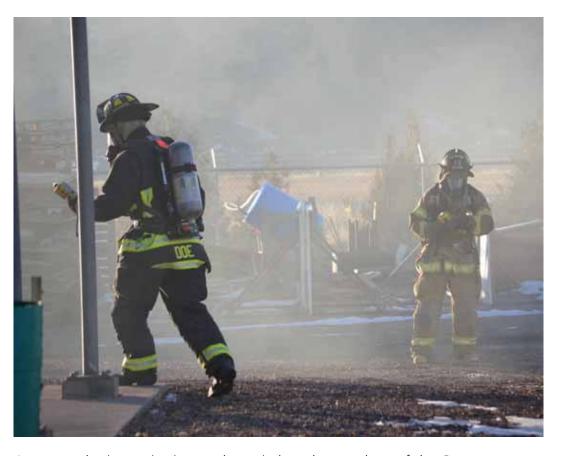
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# Atmospheric Moni Reveals Dangerou Cyanide in Fire Sm



Chief Rob Schnepp & Dr. Alan Hall An atmospheric monitoring study carried out by members of the Greater Manchester Fire and Rescue Service (GMFRS) has revealed that 33% of calls in a three month trial period exceeded health and safety executive limits for cyanide or carbon monoxide, and in 100% of calls their combined toxicity was sufficient to cause symptoms in the human body.

The pilot study was implemented after an atmospheric monitoring training session was delivered to several Greater Manchester operational watches based on Moss Side and Gorton Fire Stations by the Fire Smoke Coalition, Inc. (FSC) in October 2011.

The FSC is a US based educational organisation whose aim is to focus the required attention and resources on the consequences of breathing fire smoke, and has run an awareness campaign around the dangers of smoke inhalation, including those associated with cyanide since 1997.

Special Operations Chief Jason Krusen, President of FSC, visited GMFRS to talk about the dangers associated with the deadly toxicants in fire smoke, with a primary focus on hydrogen cyanide

(HCN) and carbon monoxide (CO), and the monitoring work the FSC has been doing in the USA. Chief Krusen also delivered practical demonstrations of how to monitor the atmospheric conditions following a house fire. These demonstrations strongly encouraged GMFRS to monitor levels of HCN and CO in house fire smoke as a matter of course.

GMFRS Crew Commander Nic Lacey, has been surprised by the frequency with which his crew has seen dangerous cyanide levels, saying: 'As fire-fighters the majority of us appreciate that smoke consists of many hazardous components, however the actual effects of hydrogen cyanide are not so widely appreciated or indeed understood. Considering the frequency that we as firefighters and the

# toring Study s Levels of oke

public we serve can be exposed to cyanide during fire scene operations the issue becomes a concern. The smoke monitoring research has shown us that cyanide is present, and that greater awareness around the threat it carries is necessary. The better informed we are, the safer both we and the public will be.'

Stark results early on in the monitoring project have resulted in nearby services taking notice. During a return visit to the UK, Chief Krusen delivered an educational seminar hosted by GMFRS which members of other fire and rescue services and other agencies such as the North West Ambulance Hazardous Area Response Team (HART) attended.

This awareness training delivered by the FSC's Chief Krusen was such a success that other fire services have started monitoring HCN and CO at fire scenes. West Yorkshire FRS and Staffordshire FRS amongst several other Services have all started monitoring projects since attending this event together with the continued support of Crew Commander Lacey.

Smoke inhalation is the single greatest cause of mortality in house fires, with 42% of deaths coming as a result of it. Cyanide is unquestionably a contributing factor. The presence of cyanide in fire smoke is well established, as it is given off when a variety of household materials incompletely combust, including plastic, wool, wood, and foam in sofas and mattresses. This incomplete combustion commonly occurs in enclosed spaces, where the fire's oxygen supply is quickly exhausted.

Cyanide gas stops the cells' ability to utilize the oxygen carried to them by red blood cells and acts synergistically with carbon monoxide; cyanide stopping the cells using any oxygen that reaches them, and carbon monoxide interfering with the ability of the red blood cells to carry the oxygen in the first place. For this reason, hydrogen cyanide and carbon monoxide are referred to as 'Toxic Twins<sup>TM</sup>' by the FSC.

Many first responders take carbon monoxide to be the only consideration when they arrive to rescue and treat victims from a burning building or vehicle. There is no specific treatment for carbon monoxide poisoning, with oxygen given as part of best supportive care helping to reverse the symptoms. However, there are antidotes available for cyanide poisoning, and treatment should be considered if the firefighter or victim is showing symptoms of reduced neurological and cognitive function, and/or cardiac irregularities.

From the rapid progress of the atmospheric monitoring project on a regional level, it is becoming clear that it will be through local recognition of the presence of HCN in smoke that the seeds of national awareness are sewn. In countries such as

France and the US, the emergency services are becoming more aware of cyanide poisoning as the culprit in smoke inhalation.

The Fire Smoke Coalition and its experts believe that factual information must be used when making claims regarding the composition of fire smoke and its constant presence in a firefighters' line of work. Additionally, solid and factual medical information should be used when training personnel responsible for assessing firefighters during rehab and treating smoke inhalation victims.

#### Why is Cyanide Poisoning in Smoke Inhalation not Recognized?

Despite recent attempts to further the recognition of cyanide as a significant part of the toxicity of fire smoke inhalation, the diagnosis is often missed because it is not considered. Again, a significant point about recognition of the illness lies in this statement – 'Remember – you can't treat it if you don't recognise it.'

The fact that significant cyanide poisoning can occur in smoke inhalation victims has been known since the 1960s (Weatherell, 1966) and was further recognized in the 1970s-80s (Mayes, 1985; Bowes, 1974; Birky et al, 1980; National Fire Protection Agency, 1983; Birky et al, 1979; Von Meter et al, 1979). However, the lack of a readily-available analytical method for emergent measurement of blood cyanide concentrations and the non-specific and non-pathognomonic nature of cyanide poisoning signs and symptoms continue to hamper making the diagnosis (Baud, 2007).

Based on the Paris, France protocol and now generally adopted in parts of the US, cyanide poisoning should be considered in any patient who is 1) extricated from an enclosed-space fire scene, 2) has soot in the nose, mouth, or throat or has carbonaceous sputum, and, 3) has any alteration in the levels of consciousness. Hypotension is a particularly ominous sign in such patients. Administration of the FDA-approved cyanide antidote, hydroxocobalamin (Cyanokit® 5 grams), is indicated for known or suspected cyanide poisoning.

A significant cyanide poisoning component should be suspected in smoke inhalation victims with otherwise unexplained respiratory failure or a persistent anion-gap metabolic acidosis (Lee-Chiong, 1999).

#### **More Facts**

Amongst a group of 479 Baltimore firefighters, exposure to hydrogen cyanide in fire atmospheres was sufficient to increase their serum thiocyanate (a metabolite of cyanide) concentrations above those of a control population (Levin and Radford, 1978).

#### ATMOSPHERIC MONITORING



Victims of smoke inhalation in enclosed space house fires have been noted to have soot in the nose or throat and carbonaceous sputum and to have alterations of conscious including coma (Hart et al, 1985). As compared to a control group of critically ill patients without smoke inhalation exposure, 66 smoke inhalation survivors had significantly lower mean blood cyanide levels than 43 such victims who died (Baud et al, 1991). Specific cyanide antidotes were not administered to smoke inhalation victims in this study.

Potentially fatal blood cyanide levels have been documented in smoke inhalation victims who have survived with supportive treatment and administrations of specific cyanide antidotes (Hart et al, 1985). It is also relevant that because inhaled hydrogen cyanide has a rather short half-life, blood samples must be obtained close to the time of extrication from the fire scene to accurately reflect the degree of impairment due to cyanide (Purser, 1992).

Higher yields of hydrogen cyanide occur in small oxygen vitiated flaming fires in closed compartments and in fully developed, post-flashover fires in open compartments at high temperatures (Purser, 1992). In such fires, the systemic asphyxiant effects of carbon monoxide, hydrogen cyanide, low ambient oxygen levels together with dense, irritant smoke which impedes escape attempts are the greatest hazards (Purser, 1992).

In an Australian study, of 178 fire-related deaths, blood cyanide levels were measured in 138 (Yeoh & Braitberg, 2004). There was no measureable blood cyanide in 52 of these 138 cases. The remaining 86 cases had a mean whole blood cyanide level of 1.65 mg/L (greater than the 1.0 mg/L generally accepted toxic level) and in 11 cases the level was >3.0 mg/L (generally considered lethal) (Yeoh & Braitberg, 2004).

Special Operations for the Alameda County Fire Department

Alan H. Hall M.D. is a board

serves as the Assistant Chief

Rob Schnepp has twenty-

four years of fire service

experience. He currently

certified Medical Toxicologist and is President and Chief Medical Toxicologist at Toxicology Consulting and Medical Translating Services, Inc., Laramie, Wyoming

For more information, go to www.firesmoke.org

#### Conclusion

Firefighters throughout the world are faced with more toxic environments than ever before. Without air management protocols that protect the body from inhaling or ingesting noxious gasses, the only way to determine the atmosphere is safe to remove SCBA is through atmospheric monitoring. While there are thousands of toxicants that have been identified on the fireground, there are only two that are treatable if exposed: HCN and CO—the Toxic Twins. Monitoring for these two toxicants on every fire scene is critical to firefighter health and safety.

Whether a firefighter or a civilian, cyanide poisoning must always be considered in any victim of smoke inhalation. It should be considered in any victim who is: 1) extricated from an enclosedspace fire scene with smoke present; 2) has soot in the nose, mouth or throat or carbonaceous expectorations; 3) has any alteration of the level of consciousness. The presence of hypotension (systolic blood pressure </= 90 mmHg in adults) when the above are present is a particularly ominous sign. The availability of an FDA-approved, relatively safe, specific cyanide antidote that can be administered in the pre-hospital setting means that, once recognized or suspected. cyanide poisoning can effectively be treated in the pre-hospital setting.

For more information about the 'Know Your Smoke: The Dangers of Fire Smoke Exposure training program, please contact the FSC. In 2013, the program was delivered in Melbourne and Brisbane. There are virtually no boundaries for delivering this life-saving program.

#### **About the Fire Smoke Coalition**

The mission of the Fire Smoke Coalition is to focus the required attention and resources on the deadly and life-long consequences of breathing fire smoke by teaching firefighters and first responders how to Prevent, Protect, Detect, Diagnose, and appropriately treat the exposure if it occurs.

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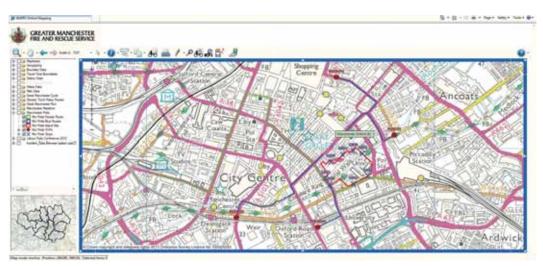
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#### **GIS TECHNOLOGY**

Screen image provided courtesy of GMFRS



# GIS as a catalyst for change in UK Fire and Rescue Services

#### **Richard Spooner**

Once the exclusive and specialist preserve of a command and control system, Geographic Information System (GIS) technology is being deployed much more widely by UK fire and rescue services.

he experience of Greater Manchester Fire and Rescue Service (GMFRS) illustrates this. A single web mapping application is now used to support a variety of business processes. These range from the recording and analysis of incidents, incident support mapping and vehicle tracking to reporting key performance indicators, targeting publicity campaigns, managing public events and even compiling A-Z maps.

'We have effectively made geography or location available as a corporate resource to anyone in GMFRS that has a business need to use it', explained Mike Baines, Corporate Planning and Intelligence Directorate.

One of the most widely used GIS datasets in GMFRS and elsewhere are incident records and the risk profile derived from them. The ability of GIS to provide live access to risk data through an easy-to-use application was central to the decision of Shropshire Fire and Rescue Service (SFRS) to provide a web mapping application to staff at its 23 fire stations.

'Our Service motto is 'Putting Shropshire's Safety First' explained John Phillips, GIS Officer at SFRS. 'We rely heavily on modern information technology to help us understand the location of different types of risk, and manage our resources accordingly.'

'Officers stressed the importance of having access to live data' added colleague and GIS Analyst, Adam Green. 'When data on a server is updated, it is important that this changed data is immediately available to end users. Lives can

depend on the accuracy and currency of the information we manage.'

Risk also underpins a simulation modelling application being deployed by Hertfordshire Fire and Rescue Service (HFRS). The GIS-based application uses data about when and where incidents have occurred in the past and are likely to occur in the future. It combines this with data on the fire service's resources and the constraints under which these operate. Fire officers use the application to simulate the likely consequences of changes in resources or incidents.

'There are practical advantages that stem from the application's close integration with a GIS', explained Gareth Bradbury, Group Commander and Head of Information management at HFRS. 'It means that we get a graphical and geographical view of the modelling outcomes of simulations. This enables you to recognise not just that certain outcomes are better or worse than others, but why and where these outcomes differ.'

UK fire and rescue services have successfully transformed themselves from organisations which dealt primarily with fire response, into organisations which seek to reduce risk. GIS has had a major part to play in this transformation.

Faced with big reductions in public sector funding, many UK fire and rescue services are now being asked to make cost savings without reducing the level of service to the public. It is likely that GIS will be just as important in this second transformation.

**Richard Spooner** is Marketing Manager at Cadcorp

For further information, go to www.cadcorp.com



#### FIRE SPRINKLERS



# Fire sprinklers in new homes:



Maria Figueroa

#### Why should firefighters care?

Fire in the home poses one of the biggest threats to people and communities. Nearly 2,500 people per year, on average, die in U.S. house fires. Last year 83% of the people who died in fires did so in one and two bedroom houses. Sixty-seven percent of all firefighter deaths in residential structural fires occurred in one and two bedroom houses.

prinkler advocates across the U.S., including the fire service, asked for a coordinated effort to encourage the use of home fire sprinklers. NFPA launched that effort through the 'Fire Sprinkler Initiative: Bringing Safety Home' in 2009. Its website provides resources for the fire service and other sprinkler advocates who want to demonstrate the need for home fire sprinklers in their community. Tools and field resources available help advocates talk with local elected officials and others about the life-saving impact of the systems.

Starting in 2006, NPFA 1 Fire Code, NFPA 101 Life Safety Code, and NFPA 5000 Building Construction and Safety Code require fire sprinkler protection in all new one and two family

dwellings. In 2009, the requirement was included in the International Residential Code (IRC).

All model safety codes now require fire sprinklers in these dwellings. Model codes represent minimum standards of safety to protect the people and the responding fire force in the event of fire in the home – by amending these codes by removing the requirement results in substandard home construction.

Opponents have launched an aggressive campaign to keep the requirement out of the code. Their misleading arguments have been refuted by scientific research; but they have sometimes prevailed due to their political power and influence. To overcome this powerful opposition it is imperative that firefighters understand the importance of

#### FIRE SPRINKLERS

the requirement, embrace it, and assist in engaging and providing factual information to stakeholders.

Home fire sprinkler systems are vastly different from commercial systems. NFPA 13D. 'Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes' covers 'the design, installation and maintenance of automatic sprinkler systems for protection against fire hazards' in these structures. They are cost effective and efficient life safety systems designed to prevent flashover and improve the chance for occupants to escape or be evacuated. Of special interest to the fire and rescue service is the added protection that fire sprinklers provide to firefighter safety. They protect structural stability, allowing fire crews to conduct search and rescue operations and perform an offensive fire attack in a tenable atmosphere.

NFPA 13D requires only the standard operating water pressure of the domestic plumbing system. Most domestic water supply systems are able to manage the operating pressure demands of a home fire sprinkler system. Communities integrating residential fire sprinklers with water supply systems employ practical solutions that satisfy the needs of all stakeholders.

Opponents of the home fire sprinkler requirement claim that smoke alarms provide enough protection in the home. Fire deaths decreased consistently after the requirement of interconnected, wired smoke alarms in new construction. A plateau was reached in the early 1990's and the maximum benefits of smoke alarms alone have been achieved.

Sprinkler systems provide additional benefits, on top of the benefits already provided by smoke alarms. The risk of fire death decreases by 83% when fire sprinklers are installed.

Smoke alarms and sprinkler systems work together to provide protection in the home the same way that seat belts and air bags provide protection in the event of a motor vehicle crash.

Opponents of residential fire sprinkler systems also like to boast that newer homes are safer homes and that the fire and death problem is limited to older homes. Statistically, the only fire safety issue that is relevant to the age of the home is outdated electrical wiring. Beyond that, age of the home has little to do with fire safety. A fire at two o'clock in the morning is equally deadly in a newer or older home.

In fact, new methods of construction negatively impact occupant and firefighter life safety under fire conditions. In 2008, Underwriters Laboratories (UL) conducted a study to identify the danger to firefighters created by engineered lumber. Its findings also point to the failure of lightweight engineered wood systems used in floors and roofs when exposed to fire. These structures are prone to catastrophic collapse as early as six minutes from the onset of fire.

Lightweight floor assemblies and roof trusses are not the only danger to firefighters found in new homes. Passive protection of these assemblies will not solve the problem. The synthetic construc-



tion of today's home furnishings also add to the increased risk by providing a greater fuel load.

Larger homes, open spaces, void spaces, and changing building materials contribute to faster fire propagation, shorter time to flashover, rapid changes in fire dynamics, shorter escape time and shorter time to collapse. Fire sprinklers can offset these increased dangers and create a safer fire environment for occupants and responding fire crews.

An NFPA study conducted in 2009 found that the cost of installing home fire sprinklers averages \$1.61 per square sprinklered foot (SF) for new construction. To put the cost of a sprinkler system into perspective, many people pay similar amounts for carpet upgrades, granite countertops, paving a stone driveway, or a whirlpool bath. The Fire Protection Research Foundation released the 'Incentives for the Use of Residential Fire Sprinkler Systems in U.S. Communities' report revealing that typical incentives offered by communities may offset up to one third of the cost of home fire sprinkler systems.

In addition to the life safety benefits provided by home fire sprinklers they reduce the average property loss by 69% per home fire. Home fire sprinklers also protect the environment, reducing carbon emissions by up to 98%. Water conservation is another benefit of home fire sprinklers. Sprinklers flowing for ten minutes require up to 90% less water than water used by firefighter extinguishing methods. Water infrastructure demand is reduced at least 47% when the homes within a community are protected by fire sprinkler systems.

Home fire sprinkler requirements are not intended to replace the fire service. Adopting these requirements has allowed the fire service to keep up with growth, and to continue to provide an appropriate level of service, which many times translate into savings for a community. Most importantly, it reduces community risk and protects new housing stock for generations to come

The NFPA has developed a free PowerPoint presentation highlighting the threats of lightweight construction methods and firefighter safety.

Maria Figueroa is the Communications Project Manager for the Fire Sprinkler Initiative – a National Fire Protection Association (NFPA) Programme

For more information, go to www.firesprinklerinitiative.org



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